VOL. V TORONTO, JUNE 1920 NO. 6

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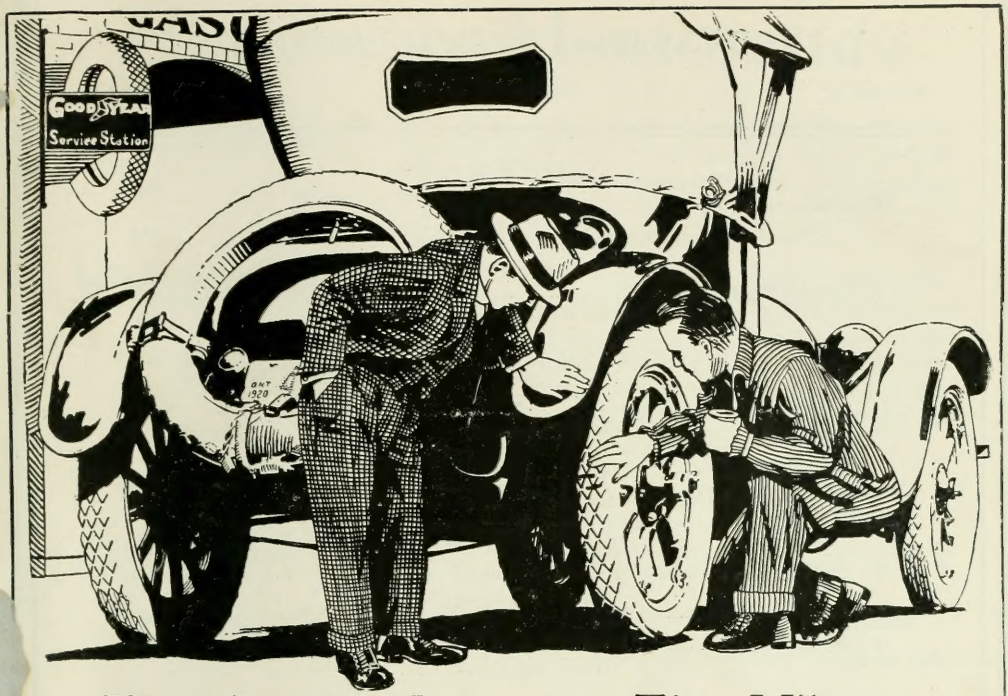

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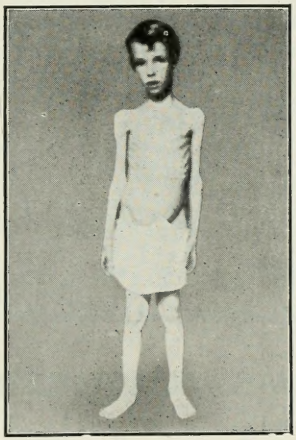

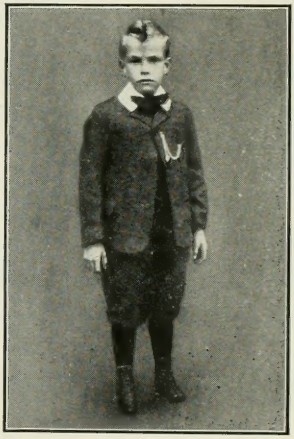

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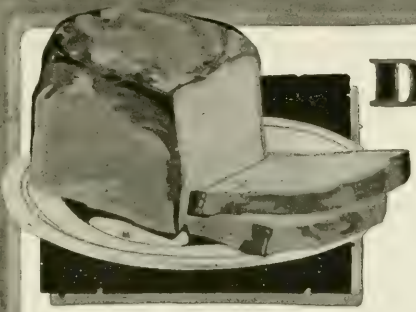

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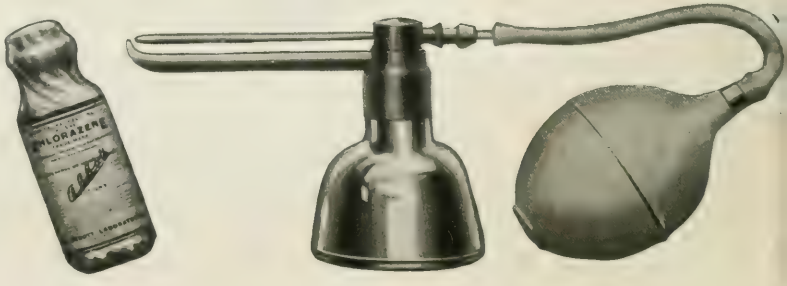

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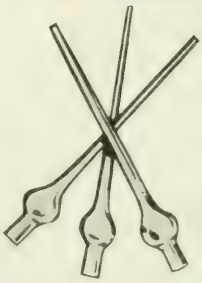

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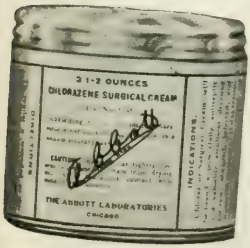

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The Canadian Medical Monthly

VOL. V., NO. 6 TORONTO, CANADA JUNE, 1920

OFFICIAL RECOGNITION.

At the Fortieth Annual Meeting of the Ontario Medical Association, held in Toronto during the last week in May, a proposal was received from Messrs. Macmillans in Canada, relative to the Canadian Medical Monthly becoming the official organ of the Association.

The following resolution was passed by the Ontario Medical Association:

"That the proposal of the Macmillan Co. of Canada, Ltd., be accepted and that the Executive Committee be instructed to engage legal advice in completing a contract."

According to the understanding of the Ontario Medical Association, the contract which remains to be completed, will in no particular restrict the Journal to purely provincial activities, but will be one clearly defining a Dominion-wide policy such as the Monthly has endeavored to maintain, with the co-operation of practitioners resident in all parts of Canada.

CHINA'S NEEDS

Efforts to Meet the Need for Medical Education in China

Chas. W. Service, B.A., M.D., Chengtu, West China.

The first step in the solution of China's physical problem was taken over 80 years ago when the pioneer medical missionary, Dr. Peter Parker, reached Canton. The number of medical missionaries has gradually increased until there are now about 400 in China. During these 80 years tens of millions of patients have been attended, and at present over 3,000,000 are treated annually. But the very success of medical missions has increased the problems. Physicians almost overwhelmed by work, who were impelled by sheer pity to do all in their power to relieve the sufferings of multitudes of Chinese, were driven to attempt, in their own hospitals, the professional education of a few Chinese students with the idea that some would remain in the hospital to assist them. Many were thus trained who have rendered invaluable assistance. One of the great evils of this old system was that those whom it turned out were not always conscious of their limitations, and often brought discredit on Western medicine. This was the genesis of most of the medical schools in China. Of course, these were not all they should be, and efforts were constantly made to strengthen them by union, and in other ways.

That missionaries are not alone in recognizing the strategic importance of medical education in China, is witnessed by the fact that the Governments of several of the Great Powers have established Medical Schools, and that Yale, Harvard and the State of Pennsylvania Universities have also entered this field. Perhaps the most important of all is the recent entrance of the Rockefeller Foundation. This powerful organization entered the field because it realized that a little help wisely applied from outside might set in motion internal forces which would eventually solve this vital problem of China. With the thought of assisting in the promotion of scientific medicine in China, the Foundation sent a commission of investigation, which resulted in the formation of the China Medical Board in 1914. They plan large medical educational schemes in Peking and Shanghai, in which teaching is to be done in English only.

There are a half-dozen Chinese Government medical schools, all of which lack funds, staff, equipment, buildings, experience, tradition and everything else necessary for success. There is slight hope in any Chinese effort for years to come, unless combined with and directed and vitalized by some strong outside organization.

Not the least important of the efforts to promote China's welfare along physical lines is medical missionary work, the pioneer of medical, dental and nursing education in China, upon the foundation of which the Rockefeller Foundation is building its great superstructure. It is recognized by all that all foreign agencies combined, whether missionary or non-missionary, are inadequate to meet China's minimum need of 70,000 dentists, 200,000 physicians and 400,000 nurses. These must be indigenously produced, but this cannot be done without outside assistance, inspiration and leadership.

The China Medical Missionary Association has chosen a half dozen large strategic centres in China for the development of strong union institutions for educating and training Chinese students in the science and practice of modern medicine, dentistry and nursing. In these colleges Chinese language is the medium of instruction, although all students are taught the English language.

One of these important centres is Chengtu, capital of Szechwan, the largest and most populous province in China. This is part of West China. Chengtu is 2,000 miles up the Yangtse River from Shanghai, and is the educational centre for 100,000,000 people. Here is located one of the four great Christian universities in China, the only university to meet the educational needs of a quarter of the Chinese race.

This university is called the West China Union University, was founded in 1910, and functions through various faculties and departments, the number of which is being increased with the passing years. These, together with hundreds of elementary mission schools, furnish every facility for pre-medical, pre-dental and pre-nursing education.

Constituted by five strong missionary organizations in Great Britain, United States and Canada, thus having international and interdenominational significance; with a Board of Governors in the homeland, composed of men of wide experience in business and educational affairs, representing old-world and new-world experience and ideals; with plans for securing a large endowment; with 120 acres of land already secured, and plans for further purchase; with over forty buildings already erected; with a large teaching staff already on the field, and definite plans for a steady increase; with a vast constituency of 100,000,000 people, consisting of Chinese, Thibetans and aborigines; with no competing institution; with nation-wide and even world-wide reputation; with the confidence and goodwill of Chinese officials and people, this university already has a well-established place in the life of China and of the world.

Three of the finest hospitals in China are located in Chengtu, which afford accommodation for 300 in-patients, and furnish opportunity for training Chinese male and female nurses. This work is already being carried on successfully, and must be increasingly emphasized and greatly strengthened. In addition, there is a dental hospital, in which three Canadian dentists are now operating. These institutions are all in affiliation with the University.

Medical teaching in the University was commenced in 1914, and dental teaching still later. The European war delayed development. It is now planned to firmly establish a combined Faculty of Medicine and Dentistry. One of the urgent needs is a college building, with the requisite laboratories and all necessary equipment, to be erected on an already assigned site on the University campus, such building to be adapted to the teaching of students of medicine, dentistry and nursing.

Salaries, residences, students' dormitories, hospitals with their maintenance and equipment, are provided by the constituent missions. Funds for the erection and equipment of various science and other University buildings are being secured from other sources. The members of the medical, dental and nursing professions of Canada and Newfoundland, together with interested friends, are being asked to provide at least $100,000 to build and equip the above-mentioned college. $7,500 of the legacy of the late Dr. R. A. Reeve has been assigned to this project, in view of the fact that he was its promoter and the efficient and inspiring chairman of the first committee formed in Toronto in this connection.

Dr. Simon Flexner of New York, and Dr. William H. Welch of Baltimore, Director of the School of Hygiene and Public Health of the Johns Hopkins University, visited China in connection with the Rockefeller Foundation investigations. Dr. Welch writes thus about our college project for West China:

"I returned from China in 1915 convinced, as were the other members of our commission, that medical missionary work is the most important agency in reaching the people of this country and in promoting their advancement and development. We were inspired with admiration of the devoted zeal of the medical missionary and with enthusiasm for the possibilities of advancing the welfare of China by means of medical education and practice."

"I know something of the project in Chengtu, situated in the capital of one of the largest and most progressive provinces in China. The needs of this province cannot be served by developments in other parts of China, and it is impossible to exaggerate the importance of maintaining and developing the college in Chengtu, already so auspiciously started. The mental, spiritual and physical returns will be great, out of all proportion to the money invested. The appeal for support should receive the most generous response from the medical, dental and nursing professions, as well as from the public."

THE MEDICAL EXTENSION WORK OF THE UNIVERSITY OF TORONTO

As is well known to Ontario readers of the Canadian Medical Monthly, the Education Committee of the Ontario Medical Association was instructed at the last annual meeting to take steps to aid the general practitioner to keep abreast of the advances in medicine and improve his clinical ability. This committee met and planned to obtain prominent members of the profession and specialists to offer lectures which they would be prepared to give before medical societies throughout the province. They were also prepared to urge on the Medical Schools the need of providing instruction for graduates at the bedside and in the laboratories.

The Faculty of Medicine of the University of Toronto also recognized the need and desire of the practitioner to keep up to date and appointed a committee for the purpose of planning Extension Courses. A long list of carefully prepared lectures was secured from the staff and these have been published by the Ontario Medical Association. The provision of special courses for graduates was felt to be, especially during this year, almost impossible. The large number of students required the use of every available good instructor for the maximum number of hours he could give to instructional work. And this instructional work does not end with the session, since all students who fail in clinical subjects in May must attend a summer course before writing again in the autumn. Some 100 students were under instruction last summer. Consequently all that the Committee could offer was opportunities to attend the instruction given in the regular way; opportunities to read and work in the laboratories and at the bedside. An attempt was made to organize some special courses for the summer months, but the dearth of teachers, many of whom were going away for special study, and the summer session for starred students have prevented all departments, save one, offering such work. In pædiatrics, however, a very well planned course is offered for the month of July. This will include clinics at the bedside and in the outdoor department of the Hospital for Sick Children. Instruction in the principles of infant feeding, with demonstrations in the milk laboratory; lectures on various special topics, heart disease, anæmias, infectious diseases, etc., will be given with clinical demonstrations. The fee for the course will be $20. Herewith appended is the time-table for the July course. Further information can be obtained from the Secretary of the Faculty of Medicine.

Post-Graduate Course in Pediatrics at the Hospital for Sick Children
July, 1920

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
9 - 12	9 - 12	9 - 10	9 - 10	9 - 10	9 - 10.30
Bed-side Clinics and Ward Rounds— Heart Disease, Rheumatism and Chorea.	Bed-side Clinics and Ward Rounds— Infant Feeding. Acute Intest. Disorders.	Neurology Clinic in O. P. D. Syphilis 10 - 11 in O. P. D. 11 - 12 Clinical Lecture— Infant Feeding.	Clinical Lecture— Infant Feeding and allied topics. 10 - 11 O. P. D. 11 - 12 Clinical Lecture— Acute Intest. Diseases. Pyloric Stenosis	Clinical Lecture— Anemias of Childhood. Congenital and acquired Heart Disease. 10 - 12 O. P. D.	Clinical Lecture— and Ward Rounds— Infectious Diseases. 10 .30 - 12 O. P. D. Malnutrition in Older Children
2 - 5 p.m.	2 - 5 p.m.	2 - 5 p.m.	2 - 5 p.m.	2 - 5 p.m.	
Ward Work— under supervision of Resident Physician.	Feeding of Normal Infants. (Memorial) Institute.	Ward Work— under supervision of Resident Physician. 5 - 6 Practical demonstration in milk modifying laboratory.	X-Ray Dept. Demonstration of plates, illustrating various conditions in childhood.	Demonstration of Pathological specimens.	

Eight lectures will be given on infant feeding, including Physiology and Pathology of digestion, with a discussion of the percentage and caloric methods in infant feeding. In addition to this, Bedside-clinics illustrating the lectures will be given twice a week throughout the course; four lectures will also be given on the acute-intestinal disorders, illustrated by cases.

Four lectures will be given on congenital and acquired heart disease and allied topics, also illustrated by cases.

Four lectures on infectious diseases, while special clinics will be given each week in (a) Neurology of children, illustrating the more common nervous disorders, with special reference to the examination of such patients; (b) syphilis, illustrating the methods of diagnosis and treatment, and finally special instruction in the diagnosis and management of malnutrition in older children.

SECTION OF DISEASES OF CHILDREN

FOREWORD.

Since Jacobi in the United States first recognized pediatrics as a specialty, most of the important work on this Continent has been contributed by American Pediatrists. The advances in this particular department have emanated from Europe, and especially in the past decade from our friends across the line. Recently the importance of this branch of medicine has become more and more recognized in Canada, and we feel that there are sufficient representative men at present in this specialty to make both scientific and clinical contributions that will do credit to pediatrics both in this and other countries.

In the past Canadian Pediatric contributions have been printed in American Journals, thereby minimizing their usefulness to general practitioners in this country. We feel that it is our duty to bring as much as is possible concerning children and their care before our Canadian practitioners. It is no slur on the man in general practice to say that the management of infants and children is probably his most difficult task and therefore we feel that any advances made in pediatrics should be of easy access to him.

A study of the first article in this section of the journal will give one a conception of the ideals that we hope to embody in this branch of work in the future.

It is desired to cover in our publications the whole realm of pediatrics. This will comprise articles of a technical nature with practical deductions, clinical studies, case reports, child welfare, and community problems relative to children. It is hoped that men, in addition to those engaged in the practice of diseases of children, will make contributions to this section.

TORONTO AS A PEDIATRIC CENTRE

Alan Brown, M.B., Toronto.

The history of the growth of pediatrics in the American Continent is interesting, starting as the subject did as a subdivision in Medicine, and developing gradually until in many medical centres it is now accredited as a separate department, and offers in many schools positions for full time teachers of pediatrics parallel with positions in medicine and surgery. Its growth from a purely academic standpoint is of considerable interest and importance. At first the field of pediatrics was limited mainly to that of infant feeding, and growth along this line has probably been greater and more efficient than in any of the other subjects in pediatrics. In almost every University Medical school the subject of infant feeding has been developed soundly and broadly, not only in the laboratory, in the hospital and the out-patient department, but also in connection with milk stations and follow-up work. This growth has been rapid and gratifying to all those who have had an opportunity to follow the development in its entirety, and such growth should set the standard for the development of the other legitimate fields in pediatrics, for it is only by the unification of laboratory, hospital and social factors that any of the problems of child welfare can be worked out satisfactorily. The medical schools, even in this field, have differed in the emphasis put on these three lines of development. In some schools the purely teaching phase has predominated, while others have dwelt largely on research work in infant metabolism, and again, the social work has lagged far behind. But from the field of pediatrics as a whole, certain high standards have emerged from all lines, and not the least of these is the child welfare social work.

The emphasis in infant feeding and the splendid development of the early problems of nutrition have led, at length, to a study of the period of early and late childhood, and to the importance of dietetics in the prevention and treatment of disease during those periods of child life. It is just here that the pediatric department needs a close relation with the department of nutrition and dietetics in the University. It is a difficult matter in a large clinic to work out individual dietaries for patients, but with the assistance of trained dietitians and graduate students in dietetics, it is possible in a hospital and out-patient department to obtain more rapid and satisfactory results. The pediatric department, on the other hand, offers to the department of nutrition a practical

laboratory, so to speak, filled with concrete problems, and thereby lends an immediate focus to the class room work in dietetics and adds a field for practical experience.

The familiarity with development and growth and the studies in these subjects are constantly opening newer and wider fields for investigation and teaching. The realization of the relation of internal gland secretion to physical and mental development indicates that great progress in this field is to be expected. Recent studies in this branch indicate many lines for research work which must be the ground work for future conclusions, and which necessarily carry a purely medical department into fields better developed at present in academic departments.

The importance of an early recognition of mental defectiveness or the early origin of mental disturbances arising during the period of adolescence demand a broader and more comprehensive handling of the subject than most medical schools are to-day prepared to give, owing to the fact that few medical men have had a sufficiently wide training in psychology. The academic department of psychology should be prepared to give most valuable assistance to the department of pediatrics. The abnormal psychology of the child and its physical manifestations and retardations are a part of the pediatric field which needs the affiliation with the field of psychology. The out-patient department is constantly offering material for such united study.

The development of pediatrics has brought other more obvious relationships with the large community problems. Work in the contagious diseases and many of the infections which are more often encountered in infancy and childhood than in later years, is receiving attention from the teaching standpoint, as well as from that of research, which is necessary for healthy growth in any line. This growth is not nearly so advanced as it is along the lines of infant nutrition and development. To study these types of infectious diseases, connection can be made between pediatric departments and local and provincial Boards of Health which are constantly in touch with the larger community problems. To my mind, it is only by a close co-operation of hospitals and laboratory with medical school inspection and Boards of Health, both local and provincial, that these larger questions of control of infection are going to be satisfactorily solved. It is, therefore, fitting that a provincial institution should interest itself in these larger problems relating to child welfare, a responsibility and duty which is inadequately met at present. The need for and advantage of co-operation between pediatric departments and all public and quasi-public institutions dealing with the problems of infancy and childhood has already been demonstrated in many centres. There is hardly a large or well organized department of pediatrics which is not sought after for advice by children's institutions either for regular medical supervision or at least in times of sickness.

The advantage of such relations with a department of pediatrics, rather than with individual physicians stands out clearly to all who deal with either side of this question. It gives the institution seeking aid uniform medical supervision and the advantages of laboratory and hospital equipment, which from individual physicians can be obtained only in an often unsatisfactory way or to a limited extent. Such institutions as infant shelters or homes for orphans or destitute children and children's charitable associations, by having a definite connection with a pediatric department not only have the advantage of the usual medical inspection, but should also have the advantages of all the other lines of activity controlled by the department, such as social service, investigation of children before admission to the institution, continuous medical supervision and psychologic examination.

With these points in mind the Department of Pediatrics in Toronto University has been, within the last year, reorganized and while our aims are high we feel that they are by no means beyond our reach.

Toronto is a city of approximately 500,000 inhabitants. The Children's Hospital, which is the centre of the Department of Pediatrics, is the only hospital of its kind in both the City and Province; the latter with a population of approximately two and a half million, thus the material for both teaching and research is almost unlimited and by comparison with other hospitals of its kind is second to none both as to equipment and material to draw from.

The Hospital has 175 medical beds in addition to 40 beds for newborn infants situated in the Toronto General Hospital directly opposite to the Children's Hospital; there are thus 215 beds available for the Department of Pediatrics from birth to 14 years of age under practically one roof. During the past year there were 1901 medical in-patients and 15,000 medical cases in the out-patient Department. There are 50 beds for children over 18 months; 75 beds for children under 18 months (not including the newborn) and 50 beds for infectious diseases.

These figures are interesting when compared with those cited by Morse in which it is shown that Harvard Medical School has only 174 beds (exclusive of the Floating Hospital and the City Hospital for Contagious Diseases) for teaching purposes and these scattered throughout six different institutions hence the obvious disadvantages of the scattering of material, however good it may be.

There are at present twelve individuals connected with the department of pediatrics, eight of whom are pediatrists exclusively. Of these eight men six received part or whole of their training in the following clinics, New York, Boston, London, England, Munich and Berlin so that in this way a varied staff has

been collected. These men, who came to the hospital already trained by pediatricians of different institutions, bring with them the ideas of their teachers, thus making it possible for the hospital to embody within itself well trained men from various clinics. In this way it cannot help but have a broad mind and lends naturally to the development of what one might term a cosmopolitan clinic, but at the same time endeavoring to develop very definite Canadian methods. The active staff of the Department is made up of young men, all of whom are actuated by a common purpose, to do just as good work as they can, to teach as well as they know how and to make Toronto the centre for pediatric teaching in the Dominion. They are willing to sacrifice themselves and their practice for the good of the University and for the advancement of the teaching of pediatrics in this country. Everyone in the department is anxious to do all that he can to give every under-graduate and graduate just what he is looking for and needs.

The hospital is divided into four services, viz.: 1st and 2nd Divisions, Neurological, including Psychology, and Infectious Divisions each having a chief with their respective associates and assistants. The out-patient and in-patient department staffs are the same so that physicians attending a case in the dispensary follow it to the ward, with very obvious advantages to both patient and clinician. Staff Conferences are held twice a month for discussion of hospital policy, methods of teaching, case reports and research work, etc.

OUT-PATIENT DEPARTMENT.

The average attendance at the medical clinic is approximately 50 per day the maximum being 125. Two days a week are reserved for special clinics in Tuberculosis, Syphilis, Neurology, Dermatology and Malnutrition in older children, while the other days are occupied by routine cases. Each clinician is supplied with a separate cubicle of his own. A clinical laboratory is located in the dispensary in charge of a laboratory worker for routine, urine, blood and stool analyses. The child welfare and social service nurses of the local Board of Health conduct all the follow-up work necessary in this department. There is present each day, one clerk and two Child Welfare nurses supplied by the Health Department (Division of Child Hygiene). In order to facilitate the distribution of patients to their respective clinicians, V.A.D. nurses of the St. Johns Ambulance Corps are supplied. Our experience in this line has been most gratifying, it relieving the hospital nurses of much arduous work and saving them for giving more technical assistance to the various physicians in the department.

Among the special features of the hospital might be mentioned the infants department which has accommodation for 75 children under eighteen months. This department is so arranged that one floor accommodates the entire department which is sub-divided into glass cubicles. The floor is divided into two

divisions (see photograph) by a central corridor and further subdivided by cross corridors, for purposes of ventilation. Opening off the central corridor are glass cubicles each accommodating two or three infants and four larger cubicles holding six to eight children each. At one end of this central corridor is a larger balcony fitted with glass windows and hot water coils. In addition to the cubicles there is a small operating room, feeding pantry, clinical laboratory and wet nurses quarters.

Each cubicle is equipped with hot and cold water and separate heating and ventilating systems with an exhaust for the impure air. Each child is bathed and changed in its respective cubicle, where all the necessities are kept. With this arrangement there is access to three different temperatures for therapeutic purposes. What is designated as the "hot room" or "premature room" is one set aside exclusively for the use of premature children and those with an unstable thermo-regulating apparatus. This room is kept at a constant temperature of 80°. The other cubicles are regulated so that their temperature is kept as nearly as possible to 60° to 65°. The balcony is maintained at the temperature of the outside air provided it does not go below 40°F. In addition to these advantages there are appliances for the administration of steam in tents and current for a galvanic battery for diagnostic purposes.

The advantage of such a cubicle system is obvious—each cubicle in itself is a unit and in this way cross infection is reduced to a minimum.

LABORATORIES.

The Institution is fortunate to have a late associate of the Rockefeller Institute as director of Chemistry of Infant Nutrition. Under the control of this director are three well equipped chemical laboratories used for investigation into the various nutritional disturbances of infancy and childhood. An excellent opportunity is thus afforded to those interested in this particular branch of graduate work. The Pathological and Bacteriological laboratories besides conducting the routine work in the institution afford excellent facilities for study in both these branches of work. There are approximately 300 post mortems per year performed on children ranging from birth to 14 years of age. Last but not least is a well equipped pasteurizing plant and milk modifying laboratory under the control of two graduates in Household Science. In this laboratory alone as many as 150 milk modifications are made each day, both students and practitioners are taught the home modification of milk in this department.

CHILD WELFARE WORK.

The Hospital is made the clearing house for infant and Child Welfare work for both the city and province. There the Health Department Physicians and nurses receive their instructions, and to this institution are referred the different problems of child care that arise throughout the various clinics (of which there are 25) in the city. In these clinics the undergraduate medical student is taught how to feed the normal infant and child.

In addition to the already mentioned departments and laboratories special clinics are held twice a week in Tuberculosis, Neurology, Dermatology, Syphilis and Malnutrition in older children. Each clinic is supervised by men trained in their respective specialty. It is the hope in the near future to establish clinics for Mental Defective Children and Cardiac cases.

With this organization we feel that the hospital in addition to caring for the sick is a real community centre and in this manner can offer to the medical student or practitioners or even specialist just as wide and practical field as is possible. While for the future physicians, the broader the contact with concrete problems during his period of training, the sooner will he be able to make his own definite contribution to medical life as he in turn meets it in home, school, hospital and community. For the physician to-day who goes out of our medical schools without realizing some of the broader applications and fields of usefulness now open to medicine is not only incompletely informed as to the modern trend of medicine, but also is handicapping the advance of medicine as one of the great educational and social factors in the development and betterment of our race and humanity.

Routine of the Department of Pediatrics

Monday	Tuesday	Wedsneday	Thursday	Friday	Saturday
9 - 12 Ward Rounds	9 - 12 Ward Rounds	9 - 10.30 O P. D.	9 - 12 O. P. D.	9 - 10.30 Clinical Lecture Theatre (Oct.-May)	9 - 12 O. P. D.
1st. Div.	2nd. Div.	1. Malnutrition Clinic			1. Malnutrition Clinic
2 - 5 p.m.	2 - 5 p.m.	2. Syphilis Clinic		Ward Work	2. Syphilis Clinic
Ward Work	Child Welfare Work at	3. Dermato- logical Clinic 11 a.m.	2 - 5 p.m. Ward Work	2nd Div.	3. Dermato- logical Clinic 11 a.m.
	2 p.m. Memorial Institute	4. Neurological Clinic (9 - 10.30)	X-Ray Department	2 - 5 p.m.	4. Medical Clinic
		10.30 - 12 Clinical Lecture Theatre (Oct.-May) 2 - 5 p.m. Ward Work 5 - 6 p.m. Milk Modi- fying Lab.		Ward Work	5. Infectious Ward Long Rounds 9 a.m.

O. P. D. —Out Patient Department.
Div. —Division.

N.B.—Special instruction will be given to those attending during the summer months when the University is closed, on Nutritional Diseases and the Percentage and Caloric Methods in Infant Feeding. The Pediatric Library in the Hospital is at the disposal of all physicians taking this course. Afternoon work is done under the supervision of the Resident Physician. Post Mortem examinations are posted daily in the Staff Room.

This time-table is for the convenience of those physicians who are only able to spend one or two weeks at the hospital, or for those who may desire to come at some other time for post-graduate work other than during the month of July.

THE SUMMER'S EXPERIENCE WITH INFECTIOUS DIARRHŒA*

EDWARD A. MORGAN, M.B., Toronto.

The presentation of this paper, viz.:—A Summer's Experience with Infectious Diarrhœa, was prompted by a desire to present to the medical profession in general, in Toronto, and to the pediatrists in particular, some aspects of a disease which has been of considerable interest to myself and more or less of a puzzle in so far as its management and treatment were concerned.

Its greater prevalence in the city this year as compared with previous years has been remarked upon by several of you, and it has, therefore, become of more immediate interest.

In the contribution, you will find no attempt at original investigation, but merely a resumé and impartial criticism of the work done during the summer, in the hope of deriving from a rather hopeless confusion of figures some helpful hints as to the diagnosis, prognosis, pathology and treatment of infectious diarrhœa in early life. Owing to the fact that the decision to report these cases was not made until the last but one had been discharged from observation, the records are not as complete as I would have liked—for example, the failure in several instances to confirm bacteriologically the clinical diagnosis.

Infectious diarrhœa is, as its name implies, a bacterial infection of the mucous membrane of the small and large intestine, usually the ileum and colon caused by the ingestion of various organisms such as B. dysenteriæ, streptococcus, B. coli, and Welch bacillus, or by the lighting into pathological activity of one of the organisms normally present in the digestive tract. This infection manifests itself clinically by a diarrhœa characterized by frequent painful evacuations of the bowels, containing pus, mucus and blood, and by a toxæmia, as evidenced by pyrexia and prostration. Clinically, the diarrhœa caused by the various organisms is identical, varying only in severity, and it is impossible always to separate cases of fermentative diarrhœa from those caused by bacterial infection, without bacteriological aid.

The difficulty in classification is due not to the fact that fermentative diarrhœa may simulate infectious diarrhœa, but to the fact that mild cases of dysentery may pass unrecognized owing to the absence of pus or blood in the stools. It is these mild unrecognized cases which are, not improbably, responsible for the spread of the infection when it is seen in the epidemic form.

*Read before the Academy of Medicine, Toronto, October, 1919.

In the series of cases presented, 8 were proven bacteriologically or serologically to be cases of true dysentery. In 3 others the only gram-negative bacillus isolated was B. coli. In none was the infecting organism proven to be a streptococcus or B. Welchi. There were in all 18 cases, and a brief summary of their records from an etiological, clinical and pathological standpoint, reveals a few facts of interest.

ETIOLOGY.

An effort was made to discover an adequate explanation for the increased prevalence of the disease in the city during the past summer, and also a clue as to a common source of infection for all the cases. The increased incidence noted recently of communicable diseases, such as purulent gingivitis (or trench mouth) or venereal disease, due to return from overseas of infected men prompted the assumption that the much-maligned returned man was responsible for the increase of dysentery.

Investigations along this line were however, unsatisfactory and unconvincing. Surprisingly few cases had, previous to the onset, been in contact with returned soldiers and in no instance was a direct contact with a convalescent dysentery case proven. When, however, one considers the chief methods of transmission of infection of this disease it becomes obvious that personal contact plays only a very small part, and I am still convinced that the most rational explanation is the presence in the community of returned soldier dysentery carriers.

Zinsser (1) and Smillie (2) have separately shewn the possibility of transmission by food stuffs, and Lucas and Amoss (3) during an epidemic of infectious diarrhœa actually caught the flies red-handed with viable dysentery bacilli on their bodies. The majority of observers are agreed that the common house-fly is the most frequent cause of the spread of the infection basing their belief on the continued prevalence of the condition during the later summer months, when the heat is not excessive but flies are still numerous. In this series 11 cases occurred in July, 4 in August, and 4 in September.

From a study of records kindly furnished me at the Meteorological Office, it appears that 55% of the cases occurred during the months having the highest average maximum temperature, 85 degrees, the highest monthly mean temperature, 73 degrees, and the lowest mean humidity 68 degrees. This was July.

An attempt was made to establish a common source of food supply in these cases, but with no result. In one house, for instance, where four cases occurred, it was impossible to find even one article of diet which was common to all four. Three cases gave a history of having eaten ice-cream cones, two or three days previous to the onset, and three others had eaten fresh fruit procured from the local fruit shop. Both these foodstuffs have been shown by other observers to be the medium of transmission of infection. No grouping of the cases into one

locality or nests of infection could be demonstrated, the infected houses being scattered indiscriminately throughout the city, only two being on the same street. It is interesting that in 9 instances there were two or more cases in the same house.

Age Incidence—Only 5 were under 1 year, 4 between 1 and 2; 5 between 2 and 3, and 5 over 3 years. The small percentage of infants explains the comparatively low mortality for the series, viz. 31.6%.

SYMPTOMS.

The onset was abrupt in 90% and was characterized by vomiting in 60%; Diarrhœa 100%; blood in stools 80%; convulsions 20%. The history relating to pus in the stools, fever, and tenesmus was too indefinite to be worth recording. Whilst under observation all cases had pyrexia of greater or less degree, depending on the severity of the infection. It has been shewn by other observers that the prognosis can be based in some measure on the height of the temperature, and the rule held good in this series. Four cases in which the maximum temperature was 101 degrees or less, recovered. In five cases where the temperature rose to 103 degrees the mortality was 20%, and of 9 patients whose temperature registered over 103 degrees, 55% died. For the purpose of comparing the mortality of fermentative diarrhœa with the infectious form, 82 consecutive cases of the former type admitted to the wards of the Hospital for Sick Children, during July and August were tabulated. The mortality was found to be 43%, but it should be noted that the average age of these patients was much below the average in the series of infectious diarrhœa. The same relationship between the height of the fever and the mortality does not exist to the same extent in the fermentative group. Vomiting during the course of the disease was present in 30%, but was excessive in only 16%. The spleen was slightly enlarged in 10%. As an aid in diagnosis, the blood count is of questionable value. All the blood examinations in this series were made in the first week of the disease. The lowest total count was 7,500 per c.m.m. the highest 18,600; the polymorphonuclear percentage ranging from 37% to 71%. The average total count of uncomplicated cases was 10,000, and average polymorphonuclear percentage 59%. These figures tally with those obtained by Bloom (4).

Blood cultures were made in 3 cases, and, as was to be expected were sterile. The invasion of the blood stream by dysentery organisms has been reported by several investigators, but it is a very unusual occurrence.

Stools—The character of the stools is typical of the condition. During the first three or four days there are numerous evacuations containing blood, and clear or slightly turbid mucus, with little fæcal material, and accompanied by tenesmus. After this period the mucus changes to pus, and fæcal matter begins to appear. The reaction is usually alkaline to litmus. Of eight cases tested in this collection, only one stool was acid to litmus.

I should like to emphasize here that the direct smear of the stool stained by Gram's method is very typical of the disease, and where conditions do not permit a culture being made, a fairly accurate diagnosis can be achieved by the clinical signs, reaction of the stools, and a study of the direct smear. Numerous pus cells are seen with very few organisms, the latter being mainly Gram-negative bacilli, a few streptococci and occasionally Gram-positive bacilli.

BACTERIOLOGY.

In spite of the enormous amount of work done to determine the bacteriology of infectious diarrhœa, the results obtained have been conflicting. In this country, the most thorough investigation was done by Kendall, Walker and Smith of Boston (5) (6) (7) (8). They conclude that any one of the following organisms may be the cause of dysentery or infectious diarrhœa: (1) B. dysenteriæ of Flexner, (2) the Shiga type, (3) B. ærogenous capsulatus or Welch bacillus, (4) B. coli, and (5) streptococcus. Their deductions are based on the isolation of any one of these organisms from the stools. Since, however, B. coli, streptococcus and the Welch bacillus are frequently found in the dejecta of normal bottle-fed infants, or children on a mixed diet, the preponderance of one of these organisms in a diarrhœal stool does not "*per se*" justify the conclusion that it is the exciting cause of the diarrhœa. The performance of serological tests, such as agglutination reactions or complement fixation tests, would have materially strengthened their position. There is, however, a diversity of opinion as to what dilution of serum giving a positive reaction should be considered as being within the normal limits, two observers placing the diagnostic limit for the Flexner organism at 1-250.

Dr. Graham, Professor of the Department of Medicine, who has done a great deal of work along this line, while attached to the Salonica Forces, summed up the opinion prevailing at present in a recent personal communication.

Firstly, failure to isolate B. dysenteriæ from stools even after repeated attempts does not mean that this infection can be ruled out. After the first week of the disease when stools contain fæcal material, it becomes increasingly difficult to obtain the dysentery bacillus by the ordinary culture methods. It is this well recognized difficulty which tends to throw doubt on the work of those observers who report diarrhœas caused by such organisms as Gærtner's bacillus, Morgan's bacillus or B. ærogenous capsulatus.

Secondly, failure to demonstrate specific agglutinins in the blood serum is not a final test, since the intensity of the reaction depends entirely on the strain used. Thus a strain, the titre of which has been worked out by personal experience, gives the most uniform results.

Agglutination tests were done in 8 cases in this series, using both a Shiga and Flexner strain; five showed reactions, which were of diagnostic significance; two of them agglutinating the Flexner organisms in dilutions of 1-160 or higher, one at 1-80, and one agglutinated the Shiga bacillus at a dilution of 1-640.

There was a certain amount of co-agglutination between the two strains. To obtain a standard for these two agglutinogens the blood of ten normal children were tested. In only two instances did a reaction occur in dilutions higher than 1-20, and none higher than 1-40.

PATHOLOGY.

Three cases came to autopsy, and two of them showed fairly typical lesions. None of the three cases had been proven bacteriologically or serologically to be dysentery.

Case 4, showed a broncho-pneumonia, acute glomerular nephritis, pseudo-membranous enteritis, and superficial ulceration in ileum and colon.

Case 6. A broncho-pneumonia was found, and, to quote the autopsy records written by Dr. Erb, Attending Pathologist to the Hospital: "The mucous membrane of the lower three feet of ileum, and the whole of the colon, is covered with a yellowish pseudomembrane which on removal reveals a granular reddened surface, which appears to be ulcerating. The membrane is removed with considerable difficulty. Solitary follicles and Peyer's patches not enlarged. Mesenteric lymph nodes pale and much enlarged."

Case 7, showed an acute nephritis, broncho-pneumonia, and, in the last foot of the ileum and the whole of the colon, scattered areas of inflammation of mucous membrane."

TREATMENT.

As far as concerns the management of infectious diarrhœa in infants, there are two distinct schools of teaching on this continent. Their views are so diametrically opposed that it seems improbable that both can be right. The Boston school bases its treatment, viz.: the exhibition of lactose, on certain fundamental biochemical and bacteriological principles. The opposing school bases its treatment, viz.: administration of protein milk, on no sound theoretical principles, but merely on the assumption that if protein milk is of value in most cases of diarrhœa, it ought to prove of value in all of them. The work done by Kendall in Boston, is convincing and very instructive, and I will endeavor to give you an outline of it as compactly and comprehensively as possible.

1. During a period of starvation, sugar which has been stored up in the liver in the form of glycogen is rapidly exhausted. When it is finished protein metabolism commences. This sugar therefore acts as a protein sparer.

2. It can be readily shown by a single laboratory experiment that members of a certain group of bacteria, amongst them being B. dysenteriæ, if inoculated into media containing both a protein substance and a fermentable carbohydrate, will attack the carbohydrate first, and when this is finished, but not before, will attack the protein, break it down, and liberate toxic products of putrefaction. In other words, fermentation takes precedence over putrefaction when both carbohydrate and protein are present in the media in which the organism is growing.

3. The specific toxin of the bacterium is produced most readily in an alkaline medium containing protein.

4. Formation of lactic acid, as one of the end products of fermentation, tends to inhibit the growth of the B. dysenteriæ and streptococcus.

Adopting these known facts as a basis for treatment, the patients were furnished with a solution of an easily assimilable, readily fermentable carbohydrate, viz.: lactose, with the belief that the patient would be benefited in three ways: (1) By a diminished absorption of the products of protein decomposition. (2) By the ingestion of a readily assimilable food. (3) By the inhibition of the growth of the putrefactive organisms and of the formation of specific bacterial toxines, as a result of the production of lactic acid.

Theoretically the treatment is sound, and practically it has stood the test, judging from the results published by Kendall, Bowditch (9), Morse (10) and others.

After reviewing the work and conclusions of these observers, it is very difficult to justify the use of protein milk in the treatment of this disease, and I believe that we have been, to say the least, ultra-conservative in that we have not even given the above treatment a fair trial.

In this series 18 cases were fed protein milk as soon as they came under observation, and were kept on it for a period varying from one to forty days. The other case was given boiled skimmed milk and decided improvement in the character of the stools was noted in 8 days. This was an exceptionally mild case of proven dysentery in an older child, the temperature never rising above 100°. With several of the patients the protein milk was temporarily discontinued and other foods such as skimmed milk, junket, and cereals, etc., were tried with no apparent change in frequency or character of the stools. Colon irrigations were given in four instances without obvious beneficial effect. Repeated injections of normal saline or 5% glucose solutions were administered, hypodermically, intravenously or intraperitoneally in 12 cases in which dehydration had to be contended with. The value of this procedure was not sufficiently emphasized by the Boston school, but it is unquestionable.

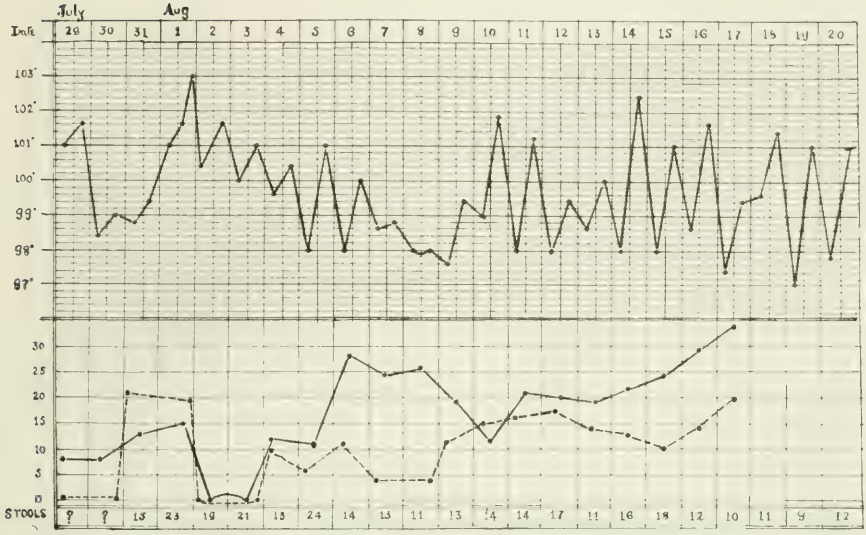
Specific antitoxine therapy was not employed in any instance, as it was found impossible to procure the serum, but good results are reported with its use.

The literature contains many reports of the successful use of autogenous vaccines, and when the antitoxic serum is not available they should be tried.

It is impossible to go into each case in this series, in detail, but the clinical histories of one or two are instructive.

Case 1.

Male, age 5 months, was given protein milk mixture, half strength, on admission. His temperature was then 98°, but rose in two days to 104°, when death occurred, ushered in by meningeal signs suggesting a profound toxæmia. The examination of the spinal fluid was negative.



Case 2.

Male, age 5 years. Given on admission full strength protein milk, and 24 hours later barley gruel, which was kept up for another 5 days. His temperature on admission was 100°, but reached normal on the eighth day. The stools decreased from 16 to 5 per diem in 4 days whilst on barley gruel.

Case 3.

Female of 9 months was given protein milk 12 hours after admission, and this food was not changed for 39 days; for 22 days her temperature fluctuated between 99° and 103° and stools averaged 5 per diem. She ultimately recovered.

Case 19.

Female, age 6 months, is still under observation. Protein milk 2/3 was given on admission, and child was on this food for 14 days; the temperature during that period fluctuating between 99° and 104°. Five per cent. lactose solution was then given by mouth and daily hypotermoclyses of glucose solution. The day following the administration of lactose the temperature dropped to 102°, and then dropped to 98°, where it stayed for two days. The stools diminished in frequency for the first four days following the exhibition of lactose, and a direct smear of one of them, stained by Gram's method, presented a picture which is considered typical, viz.: the disappearance of the Gram-negative bacilli, and streptococci, and the reappearance of numerous Gram-positive bacilli, of the B. acidophilus type. Two attempts have been made to isolate B. dysenteriæ from the stools of this patient without success.

Case 17.

Female, age 4 years, a proven case of dysentery, was sick 8 weeks, the pyrexia persisting for 5 weeks. The food was changed many times, protein, klim, skimmed milk, barley gruel and soft diet, all being tried. The chart which I will shew is instructive in that it pictures the temperature curve of an uncomplicated case of true dysentery of unusual severity and duration. In it I have endeavored to show a relation between the daily protein intake and the height of the pyrexia. The stroked line in the lower part of the chart represents the number of grams of protein ingested each day. The solid line represents the daily carbohydrate intake. It will be seen that in some measure the curve of the protein intake follows the temperature curve above: for instance, a drop in the pyrexia on July 29th and 30th, when only barley water was administered, a sharp rise to 103° following feeding of protein milk on July 31st, a gradual reduction of temperature from the 1st of August to the 4th, when nothing but water was given. From the 5th to 9th the daily intake of protein was comparatively low, but the carbohydrate intake was markedly increased. It is possible that it was this carbohydrate excess which delayed or prevented the bacterial action on the protein and interfered with the formation of products of putrefaction, thus causing a reduction of the temperature. The wide fluctuations of temperature from August 10th to August 20th, are suggestive of an ulcerative condition in the intestine which would facilitate the absorption of toxic products.

The indications for treatment then are: (1) neutralization of specific toxines by injection of a specific antitoxine, if this is available; (2) correction of dehydration by saline or glucose injections; (3) prevention of formation of toxic products of protein putrefaction by administration of a food rich in carbohydrate; (4) specific vaccine therapy.

In a small series of cases such as this, it is obviously absurd to attempt to draw conclusions, but the summer's experience has left me with a definite conviction that protein milk is contraindicated in cases of infectious diarrhœa of the dysentery type, and I think this conviction is shared by other pediatrists in Toronto who have followed these cases, or similar ones. It is my hope that this report may serve to stimulate us to the formation of a more accurate bacteriological diagnosis of the disease, and to the institution of a more logical treatment based on a correct conception of the fundamental biochemical principles involved.

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REPORT OF TWO CASES OF ATRESIA OF OESOPHAGUS, WITH TRACHEO-OESOPHAGEAL FISTULA*

George E. Smith, B.A.M.B., Toronto

It is probable that malformations of the œsophagus occur far more often than reports would indicate. Besides the two cases presented below, there has been one other instance come under the writer's notice during the past year. This was one of congenital stricture of the œsophagus which is being cured by gradual dilatation. Unfortunately only the stricture type of case can be benefited. The stricture of the œsophagus usually does not give trouble until the infant begins to have a diet including soft or formed food, unless the opening is very small.

The two pathological conditions which give early vomiting in infants are pyloric stenosis and malformation of the œsophagus. In the latter condition, there is regurgitation of unchanged food, rather than the projectile vomiting occurring in pyloric stenosis; the regurgitation begins just as soon as nursing is started; and there is no fæcal matter in the stools.

By the introduction of a soft rubber catheter (No. 10 English), an obstruction is felt, the tube not entering the 12-13 c.m. which is the distance to the stomach from the alveolar ridge. Of the types of malformations, the two reported here, namely, atresia with tracheo-œsophageal, fistula is the commonest.

In order to appreciate the different types of malformation of the æsophagus, one should remember that the respiratory apparatus is an outgrowth from the ventral aspect of the foregut. As early as the 15th day a furrow appears in this location, the so-called pulmonary groove. The groove becomes at first partially and then completely separated from the dorsal part of the foregut. This is brought about by two lateral ridges which, gradually approaching each other, finally meet, forming two tubes, the dorsal being the œsophagus, the ventral being the respiratory apparatus. Any defect in this embryological process will tend to a malformation of the œsophagus.

Cautley[1] has published the most complete collection of œsophageal malformations. A tabulation of the defects and the number of cases he has collected is given below. Since Cautley's paper, Morse[2] has reported two cases of stricture of the œsophagus.

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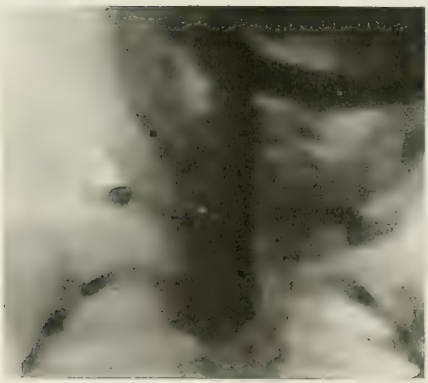
*From the wards of the Hospital for Sick Children, Toronto.

TYPES OF MALFORMATIONS OF ŒSOPHAGUS.

A. Complete Absence —6 cases.
B. Double œsophagus —2 cases.
C. Tracheo-œsophageal fistula —6 cases.
D. Congenital dilatation —6 cases.
E. Atresia œsophageal stricture —28 cases.
F. Atresia œsophagus obliterated —17 cases.
G. Atresia with tracheo-œsophageal fistula —87 cases.

Case 1.

N. S. was brought to the Hospital when one week old on account of regurgitation of food, and loss in weight. The baby had nursed well for the first few days, but on admission was nursing indifferently. The birth weight was 6 lb.



Case I.
Showing the pouch filled with Barium solution.

Case I.
Showing the upper blind portion of the œsophagus with the fibrous band jointing it to the trachea.

10 oz. On admission to the hospital the weight was 4 lb. 8 oz. The skin was dry and the baby dehydrated. There was a moderate degree of continuous cyanosis, which was more marked at intervals and accompanied by dyspnœa. Coarse râles could be heard over both lungs. The temperature ranged from 101 to 103 degrees. The stools were few and consisted of dark coloured mucus with no fæcal matter. Sometimes during, but immediately after nursing, the feeding was returned. At times this contained mucus and milk debris. A No. 10 English soft rubber catheter was introduced, resistance being encountered when the tube had reached 10 c.m. from the alveolar ridge; it could not be forced past this point. The X-Ray showed the œsophagus occluded at the level of the second dorsal vertebræ. The infant gradually lost weight, being 4 lb. 4 oz. at death which was 10 days after birth. At autopsy, a complete atresia of the œsophagus was found. There was a fibrous band extending from the blind end of the œsophagus to the trachea, and a fistula connecting the trachea with the lower part of the œsophagus as depicted in the photograph.

Case 2.

G. A. was admitted on the 8th day after birth because of regurgitation of food and mucus, cyanosis, and loss in weight. It was a full term infant. Frequently after nursing it had an attack of choking accompanied by vomiting. The vomitus resembled yellowish-white pus. The stools were greenish mucus with no fæcal matter, averaging one a day. The baby weighed 9 lb. 8 oz. at birth, was 6 lb. 4 oz. on admission, and at death, 10 days later, weighed 5 lb. 11 oz.

CASE II.
Showing the œsophageal pouch with Barium solution.

CASE II.
Showing blind upper portion of œsophagus. Probe passes from trachea into lower portion of œsophagus.

By the use of saline subcutaneously, the infant increased in weight for a few days. A duodenal catheter was passed into the œsophagus, a distance of 10 c.m. from the alveolar ridge, before obstruction was encountered, at the level of the 3rd dorsal vertebra. A bronchoscope was passed by Dr. Edmund Boyd, who reported that the œsophagus ended in a pouch about 10 c.m. from the gums. The œsophagus was larger than in case 1 and held more feeding. Mucus and milk debris could always be obtained by aspiration. The X-Ray showed a blind œsophageal pouch. At autopsy, the œsophagus was found to be 1 c.m. in diameter, ending in a pouch 5 c.m. below the pharynx. Opposite the bifurcation of the trachea there was a fibrous band passing from the œsophagus to the trachea, just above the fistulous communication between the trachea and lower portion of the œsophagus.

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THE FORTIETH ANNUAL MEETING OF THE ONTARIO MEDICAL ASSOCIATION

No more successful meeting has ever been held by the Ontario Medical Association than the fortieth convention which took place in Toronto during the last week of May.

The Association was most favored by ideal weather conditions, excellent papers, large attendance and pleasant social functions.

The membership in the Association is growing rapidly, practitioners in all parts of Ontario realizing the advantages of linking up with a live organization such as Ontario now possesses. The July issue of the Monthly will contain some interesting material presented at this meeting.

SOURCES OF ERROR COMMONLY ENCOUNTERED IN THE GROSS AND MICROSCOPICAL EXAMINATION OF STOOLS OF INFANTS.

Angelia M. Courtney, Toronto

One of the most important means of controlling the artificial feeding of infants is the consideration of the gross appearance of the stools supplemented, under some circumstances, by microscopical examination. This may be very useful from two points of view.

First, the experienced observer, by noting certain characteristic colors, consistency and the presence or absence of curds and mucus, is able to determine whether one or another of the food components is in undue proportion and finds indications as to the direction in which the food needs to be modified.

In the second place, an attempt is made to judge of the completeness of utilization of the food as a whole. It is here that a serious error is likely to occur. It is serious because sometimes, as the result of an incorrect conclusion, a large reduction is made in the total food or in the amount of fat or carbohydrate, which is followed by an immediate loss of weight from inadequate calorific intake. For this reason it is of the greatest importance to be able to distinguish a condition in which the food is not being utilized by reason of dietary defects, particularly over-feeding, from one in which it is not being utilized as a result of enteral or parenteral infections. In order to make this decision, it is necessary to know with approximate accuracy the twenty-four hours' quantity of feces and whether or not the stools are abnormally watery. Unfortunately if they are diarrhœal, not very definite knowledge of food losses is available unless an approximate idea of the total daily water content of the feces can be obtained.

It is all too common in practice to examine one of the day's stools and make a mental multiplication, according to the number of stools reported for the day, in order to decide how well the food is being utilized. Anyone who has had experience in collecting the twenty-four hours' quantity of feces knows how faulty such a method is. It is the rule rather than the exception for different stools of the day to vary materially in size and consistency. In the case of formed and semi-formed stools it is not a difficult matter to collect as a routine, for the purpose of estimating the food utilization, the complete twenty-four hours' specimen by carefully transferring the stools from the napkin to a receptacle with cover. It is desirable to keep in separate receptacles stools of the same day distinctly different in firmness, as, otherwise, it is very difficult to make mental comparisons with the normal standards obtained from experience.

It is hardly necessary in this connection to call attention to the frequently wide variation in the amount of feces on successive days and the consequent necessity of considering the preceding day as well as the one immediately in question.

That the *percentage composition* of the stools, which may be more or less accurately estimated from gross appearance and microscopical examination, has frequently no relation to utilization of food is well illustrated by some instances which follow, selected from recently published work from the Laboratories of the Rockefeller Institute and the Babies' Hospital, New York (1). Since the per cent. of nitrogen, even calculated as protein, and the per cent. of total salts show less variation in feces of all types than the per cent. of fat, a consideration of the fat alone is enough to demonstrate the point.

One child with constipated stools containing 48% of the dried weight as fat, retained 45 grams of fat, which was 94% of the intake; while another, with similar stools of 45% fat content, retained only 22 grams of fat, which was 84% of the intake. The first child was utilizing his fat well and there was no reason for any drastic cutting of the intake, though the feces contained an unusually high proportion of fat. On the other hand, the second child was not utilizing well his considerably smaller intake. This difference could only have been brought out by a comparison of the daily amounts of feces of the two infants. Similar comparisons to the foregoing may be made among stools of other types. A child who had normal-appearing stools with 37% of the dried weight as fat, retained 91% of the intake; while another having the same type of stools with a fat content of 36%, but double the daily amount of feces, retained only 86% of the intake, losing more than twice as much fat in his stools as the first-mentioned child. Again, among a group of children having stools approximately normal in appearance, but containing somewhat more water than the normal, the stools in one case contained 39% of the dried weight as fat and the child retained 91% of the intake; while in another with stools of 41% fat content, the retention was only 79% of the intake, and the fat loss, because of the large amount of feces, was double that of the other child. For all practical purposes differences of this sort in the case of formed and semi-formed stools can be discovered by the practising physician without the necessity of conducting metabolism experiments.

When the stools are abnormally watery, however, the problem of judging of the food utilization is more difficult, and the estimate can never be even approximately quantitative unless a separate collection of the feces can be made. This is due partly to the fact that the total loss of food components in diarrhœal stools depends not only on the amount of total solids, but also on the water content, which materially affects the proportion in which different materials are excreted. Always the loss in total solids and soluble salts is approximately proportional to the water content of the feces; and in severe diarrhœa the proportion of fat in the stools is greater than the average in non-diarrhœal stools.

Moreover, an estimate of the total solids lost during the day cannot be made with any accuracy from an inspection of even the entire number of napkins used, since the great amount of water excreted causes the solids to be spread in a thin layer and even to be absorbed by the cloth to a considerable extent. For this reason the most successful way for the clinician to study losses of nutritive material in diarrhœa is to try to obtain as nearly accurate information as possible as to the total water losses during twenty-four hours, remembering that the total solids and consequently nutritive material in the feces are approximately proportional to the water content. This estimate is not an easy one to make, especially as part of the water on the napkin is usually due to urine. Close watchfulness seems to be the only means of obtaining this information, except in the rare cases where a separate collection of urine and stools can be made.

That a knowledge of the daily amount of water lost in the feces is most valuable in order to ascertain the extent of losses of nutritive material in diarrhœa, is shown by a few figures from work done in the before-mentioned laboratories (2). The twenty-four hours' feces in eleven instances in which the water content averaged slightly over an ounce and never equalled two ounces, contained on an average 8.8 grams of solids, of which 3.1 grams were fat, 2.3 grams were protein calculated from nitrogen and 2.2 grams total salts, of which only one-eighth was soluble salts. In fourteen instances in which there was a water content of from three and one-half to six and one-half ounces, the content in solids averaged thirteen grams, of which 4 grams were fat, 3.6 grams protein, calculated from nitrogen, and 2.7 grams total salts, of which about one-fourth was soluble salts. In ten instances in which the water content ranged from about 7 to more than 18 ounces, the total solids averaged 21 grams, fat about 8 grams, protein 5.6 grams, total salts 4 grams, of which one-half was soluble salts. In this group the extreme case showed a water content of more than a pint, over 37 grams of total solids, 13 grams of fat, 10.7 grams of protein and 4.8 grams of total salts, of which more than half was soluble salts. Such variations as these show that in diarrhœa there is a wide difference in food utilization between conditions in which the water excretion is not excessively great and those in which very large amounts of water are lost during the twenty-four hours. Thus the treatment to be followed in the respective conditions, both as regards feeding and the use of subcutaneous and intravenous injections of fluid, must necessarily differ greatly.

There is another reason why it is important for the clinician to know with some degree of accuracy the amount of water lost by those infants whose stools are suggestive of intestinal irritation. It is essential to distinguish between diarrhœal stools and those which have no large water content, but contain mucus and curds and frequently show green color and other signs of abnormality. These may fitly be described as nonhomogeneous stools. With these the daily loss in nutritive material is often not abnormally great. The collection of total

feces for the day would show when there was an unusually large excretion. Such nonhomogeneous, but not watery, stools indicate the need of ascertaining the cause of the irritation, rather than the necessity for reducing the food as a whole. An average of the per cent. of the fat intake retained in twelve such cases was 89, with over 90% retention in five of the cases (1).

To summarize the foregoing: (1) A study of the composition of the stools as they are seen on the napkin, even supplemented by a microscopical examination, together with a knowledge of the daily number passed, gives no reliable information as to the completeness of utilization of the food. To learn this it is of far more value to collect approximately the twenty-four hours' quantity of feces. A comparison of this quantity with normal standards established by experience should carry great weight in any decisions regarding increase or decrease in the amount of food. (2) When stools are abnormal in appearance it is a matter of great importance to determine as nearly as possible the amount of their water content for the twenty-four hours. Abnormal-appearing stools may have a small water content and represent no serious loss of nutritive material, thus necessitating no extensive reduction of food. If diarrhœa is present, however, it is another matter and the intake of food must be regulated accordingly. Moreover, in severe diarrhœa fluid must be added to the body by subcutaneous or intravenous injection. Since there is a wide variation in daily water content of the feces in diarrhœa, intelligent control of either feeding or injection of fluid can only be possible when there is a knowledge of the approximate daily water loss through the stools.

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OBSERVATIONS ON ECTOPIC PREGNANCY

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It would appear that so much has been written regarding the diagnosis of this condition, both before and after rupture, that the last word has been said that would aid in establishing a correct diagnosis. The writer of this article begs to submit his personal observations made from a collection of forty-three cases which occurred in his own practice and which received operative treatment at his hands.

In text books dealing with this subject, the usual history of a case generally reads: "A patient, six weeks pregnant, is suddenly seized with pain and hæmorrhage, followed by faintness and collapse." This history, though characteristic of many cases, it is true, is not the only one obtainable, and a great many have a history which reads otherwise, and many and various are the histories given It is noteworthy, however, that no matter whether there be collick pains felt for some weeks or not, or whether hæmorrhages be absent, there is generally a history of suspected pregnany for about *six weeks*; at any rate, the "six weeks" seems to crop up in the history given by the majority of cases.

To-day there is a tendency to regard such cases as do not exhibit on microscopical examination, fœtal structures, as belonging to a class designated ovarian hæmorrhage and tubal hæmorrhage, due to some obscure cause. Dr. Bovee, of Boston, has written a most interesting paper dealing with this phase of the subject. It would appear from his observations that not all tubal hæmorrhages are ectopic in origin,—that many cases diagnosed as ectopic are not so in reality, but are due to some other cause. However that may be, and no doubt the inference is correct in many cases, it is a remarkable fact that in the writer's group, all (forty-three) have been exposed to pregnancy, and that not once did the condition occur without a history of such exposure. In the majority of cases observed, there was generally small, external hæmorrhages observed by the patient at some time during the six weeks, dating almost from the time she considered herself pregnant. This symptom was not present in all cases. I may say it was absent in sixteen cases of the series observed by the writer. The short, sharp, cutting pain is complained of by the majority of patients; such history is generally elicited on carefully questioning the patient. There are two other strong, presumptive signs which may be brought out on careful examination of the patient: first, the slow, steady increase in pulse rate which may be observed from day to day; second, the extreme tenderness elicited by slight lateral pressure on the cervix. This, combined with one of the other symptoms, viz., slight repeated hæmorrhage from uterus, collicky pains or gradually

increasing pulse rate, is very suggestive of ectopic pregnancy. Of course, as the case progresses, there may be some of the above symptoms, e.g., pain, sudden and sharp, followed by actual faintness or collapse. A brief history of some cases of the series may be interesting.

Case I.

Mrs. A., age 24 years, mother of two children, younger child two years old. Patient suspects she is pregnant about six weeks; has had slight collicky pains in abdomen; last severe pain was followed by a sense of faintness; also has had slight hæmorrhages. Vaginal examination shows extreme tenderness on pressing laterally on cervix, also small mass in right tube. There is also tenderness on pressure on right side in region of right ovary. Pulse 84, temp. normal; next day—pulse 96, temp. normal. Operation one day later. On opening abdomen down to the peritoneum, dark color shows through peritoneum. Abdomen contains much blood; some large clots. Fingers passed to right tube, grasp the bleeding mass about the size of a hen's egg in right tube. This mass is ligated and removed. Fœtal structures may be made out, bloody clots removed from abdomen. Abdomen closed. Good recovery. Patient was discharged, well, 12 days later.

Case II.

Mrs. B., age 35, mother of six children, youngest three years old, complains of small hæmorrhages each day for three weeks. Examination of abdomen is negative. Pulse 84; next day, 86. Removed to hospital for observation. Pulse, following day, 88, followed by an advance to 90 next day. Lateral pressure on the cervix elicits pain. Abdomen opened next day; fluid blood shows dark through the peritoneum. A small bleeding mass is found in right tube bleeding through the fimbriated end of tube. Right tube is ligated and removed. Clots removed from the abdomen. A small draining tube inserted. Recovery is normal. Patient discharged, well, at end of two weeks.

Case III.

The following case of left-sided ectopic, followed one year later by similar condition in right, may be of interest:—Mrs. Hill, age 30, mother of one child, 6 years old. I was called to see her on June 13th, 1914. Patient is blanched and feels faint. Pulse small, rapid and weak. She says that she felt well till about noon. While walking across the room she was seized with sharp, cutting pain in abdomen; felt faint and fell to the floor, where she remained till help was summoned. I had her removed to the hospital at once, and kept under observation for one or two hours. By that time she appeared as if she could stand operation, which was proceeded with. The abdomen contains much blood, and a bleeding mass in left tube. This I removed with left tube; abdomen filled with normal saline. Patient made an excellent recovery, and remained well till one year later, June 15th, 1915, when I was again called. She was again quite blanched; small pulse. When asked what she complained of, she replied, "I have just the

same trouble I had last year." I quite agreed that her condition was similar, and advised operation, adding the promise that she would never have to undergo the same again. She agreed, and within one hour she was ready for operation. Exactly similar condition was found on right side. This was removed with right tube, and recovery was complete; patient leaving hospital in two weeks.

Case IV.

Mrs. D., age 36, mother of one child, 10 years of age. While travelling by train was seized with pain, followed by faintness. When I saw her she was sitting in the waiting room of R. R. Station, along with a large number of travellers (female), awaiting next train. Her appearance alone would almost tell the history. It was not necessary to point out which one had sent for medical aid. She gave no history of previous hæmorrhages; she suspected pregnancy, but was not sure. She was kept under observation at hospital for 16 hours, during which time pulse rate was gradually increasing. Vaginal examination was negative, except that lateral pressure on cervix caused sharp pain. A diagnosis of ectopic pregnancy was made and patient operated on. The usual condition, viz., abdomen containing blood, some clotted, some free; bleeding mass in left tube; all of which were removed and good recovery followed.

Case V.

This patient, mother of 4 children, youngest 4 years old. She is pulseless; skin cold and moist; temp. subnormal. Gives a history of ruptured ectopic. Prostration so great that operation is deferred for a few hours in hope of some improvement. Twelve hours later, pulse is quite rapid, 120, but of good volume and strength. Brought to operating room, and abdomen opened. Very large quantities of blood removed. Ectopic (ruptured) found on right side. This was quickly removed. Saline and stimulants given. Good recovery followed. Left hospital three weeks later.

Such is the history of some cases that the diagnosis is quite easily arrived at; others are somewhat more difficult, and may require to be kept under observation for two or three days. Such as Mrs. M., who complained of nothing but pain in abdomen, but whose pulse rate gradually increased, and pain and discomfort at night followed. Vaginal pain showed tenderness on lateral pressure on cervix. Indistinct mass in right pelvic region. Operation revealed a right-sided ruptured ectopic pregnancy. Excellent recovery followed two weeks later.

The diagnosis of ectopic pregnancy in any case should not be long in doubt. Neither should operatic treatment be delayed unless in the few cases where shock is extreme, and then delay need be only for a few hours. In many cases the secret of success lies in the rapidity, and secure and well-ordered manner in which the operator does his work. Once the patient is anæsthetized, everything should be in readiness. Operator's hands should get into the abdomen quickly, and do the necessary work thoroughly but quickly, and get out just as rapidly as possible. Fifteen or twenty minutes should suffice to do all the

required work. The use of retractors is seldom necessary, and if used should be but lightly held. No unnecessary pulling or handling of abdominal wall. As to the use of drainage, the writer found it unnecessary in the majority of cases. In a few, however, where time counted so much that some clots were left behind, drainage was used: just a small drain at lower end of wound; and judging from the amount of saturation on dressing the following day, one would conclude that the drain was necessary.

It would appear from the writer's experience, that the condition is perhaps of more frequent occurrence than is generally supposed; that diagnosis before rupture is rare. In only one of the writer's cases was the condition diagnosed before rupture. Also that the results of operative treatment are most satisfactory; even in cases of most severe hæmorrhage, recovery is remarkably rapid. That with proper care, rapid and careful surgical procedure, the death rate should be practically nil, at least not greater than 1% or 2%.

THE HIGH COST OF PRINTING

Like the cost of all commodities, the cost of producing this Journal has steadily increased, until to-day the subscription price does not begin to take care of its fair share of the expenditure. And the end is not yet in sight. The price of paper, printing, etc., is still on the upward trend, all of which leads us to state that an advance in our subscription rates appears almost inevitable. The profession may be assured that any such advance in price to them will not be with our wishes, but with the frank admission that to keep up our present standard we must increase our revenue.

SHOCK—SOME RECENT ADVANCES IN ITS PHYSIOLOGY AND THERAPY*

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The fundamental cause of surgical shock still remains obscure. No single etiological factor has been suggested as the invariable cause. That there are many secondary contributory factors seems clear; but when these are largely eliminated by early preventative measures, the condition often persists and the patient succumbs. In view of the lack of knowledge as to the initial cause and subsequent development of shock, it must be recognized that the condition met with clinically is the end result of a primary and several contributory causes. During the latter part of the war, the cases of shock were classified as primary and secondary. The first group suggested a prolonged fainting spell with recovery within an hour or two, while in the secondary type, the symptoms persisted and the patients' conditions grew gradually worse. It is concerning this latter type of secondary shock that I wish to draw your attention this evening. Clinical observation and physiological studies all go to show that secondary shock when fully developed is essentially a partial suspension of the circulation. This state of defective or altered circulation will account for practically all the phenomena commonly seen in shock, such as pallor, thirst, rapid pulse, low blood pressure and capillary stasis. Although the clinical condition is generally recognized and unmistakable, I shall describe a special case I saw personally at No. 3 Casualty Clearing Station in August, 1918. This soldier, 19 years of age, was sleeping in a billet with ten other men, several miles behind the front line. The hut was directly hit by a German bomb. Four men were instantly killed, three others seriously wounded, while this soldier remained in a state of collapse. On removal to the Casualty Clearing Station, there was no improvement in his clinical condition. Internal injuries with consequent hæmorrhage were suspected, but no definite localizing symptoms were observed. In spite of thorough treatment, his condition gradually became more serious and twenty-four hours after he had been given an intervenous infusion of 600 c.c. the hæmoglobin percentage amounted to 125%. He died a few hours later. At the autopsy performed by Major McNee, Pathologist to the First British Army, no definite external wounds were found, except a few superficial bruises, and no gross internal hæmorrhage had occurred. This case, I take it, was a

*Read before the Academy of Medicine, Toronto, March 2nd, 1920.

typical instance of surgical shock, which followed severe injury and in which hæmorrhage played no part.

At this point, it would seem opportune to review some of the suggested theories regarding the cause of such a clinical condition.

1. *Myocardial Failure.*

Inefficient cardiac contraction has long been considered an important factor because of the rapid weak heart action and the fall in blood pressure. But that cardiac failure is the fundamental cause has been given up, chiefly because cardiac stimulants avail little, and also because the heart removed from a shocked animal on perfusion may respond normally.

2. *Exhaustion of Nerve Centres.*

Crile many years ago stated that there was a failure or paralysis of the vasomoter centre, and this accounted for the drop in blood pressure. Porter and many others have shown conclusively that in shocked animals the vasomoter tone may even be increased until the terminal stages of the condition. I have observed a similar condition in a severely wounded soldier. Then again, paralysis of the splanchnic vessels due to a reflex peripheral dilation has been advanced as a chief factor, but in both experimental and clinical shock, this condition has not been observed by many different workers.

3. *Exaemia or Suspended Circulation.*

As stated above, clinical observation and physiological studies carried on during the war all went to show that shock when fully developed is essentially a partial suspension of the circulation. Or in other words, the effective blood in circulation was reduced in amount. There is much laboratory and clinical evidence in support of this viewpoint of an exæmia. But we are still in the dark as to its primary cause. Nevertheless the recognition of shock as a condition in which the amount of circulating blood is reduced has been of immense importance in both affording an index as to the extent of the process and pointing the way to the employment of beneficial therapeutic measures.

EXÆMIA IN EXPERIMENTAL SHOCK

The following experiments will not be described in the order in which they were carried out, but with special regard to their bearing on the general problem of suspended circulation. The methods employed for producing the condition in animals were numerous. The main procedures were:

(a) Severe hæmorrhage—later I shall have more to say regarding the intimate relationship between shock and hæmorrhage.

(b) Exposure to severe sudden cold, as immersion of the animal in ice water.

(c) Trauna to and exposure of viscera.

(d) Clamping off the blood flow to a large portion of the animal for a given period of time, as the inferior vena cava or abdominal aorta.

1. *Professor Erlanger's Experiments.*

Erlanger produced shock by four of the different methods outlined above, and noted the similarity of the symptoms produced and emphasized the importance of the reduction in blood volume. His explanation of the mechanism of the condition is as follows:

First there is a slowing of the blood stream in the periphery; this leads to a reduction of the blood mass in the venous circulation—there is then a smaller amount of blood delivered to the heart—the cardiac output is decreased and a low arterial tension results.

The explanation of the factors producing shock places the primary seat of the trouble in the peripheral vessels—particularly the capillaries and venules. Thus Erlanger's main contention as to the etiology of shock is in marked contrast to those who formerly considered the weakened heart or partially paralyzed medullary centres as responsible for the condition.

2. *Dr. Dale's Experiments.*

In 1911, while studying the pharmacological action of histamine (a decomposition product of protein digestion), Dr. Dale observed that when a large dose was administered a condition similar to surgical shock developed. Continuing these researches during the period of the war, he soon came to the conclusion from observing these histamine shock animals, that the fall in arterial pressure was a secondary result of lack of blood in effective circulation. He was thus led to similar conclusions as Erlanger, that the primary lesion was in the peripheral circulation and most probably in the capillaries. From further studies he concluded that histamine acts primarily as a poison on the capillary endothelium—thus giving rise to capillary stasis of the blood, and later permitting the plasma to pass out into the tissues. It is of interest to note that Dr. Dale in these experiments recognized the important role played by anæsthetics. His original studies were carried out on cats under ether anæsthesia. After considering the experiences of the army surgeons with different anæsthetics, he found by actual experiment that it took ten times as much histamine to produce shock in an unanæsthetized animal as in an animal previously anæsthetized with ether. He went further and demonstrated that it also required ten times as much of the histamine to produce shock when the animal was given nitrous oxide rather than ether. This fact will be referred to later when discussing the treatment in clinical cases.

3. *Experiments Carried Out by Bayliss and Cannon.*

Both these physiologists had the idea that clinical shock might be toxic in origin, and that a histamine acting like substance might possibly be formed in

injured muscle and when absorbed into the blood stream cause symptoms of shock. In their experiments in which this theory was put to the test, they crushed the leg muscles of cats and definitely proved that the subsequent shock was not due to a nervous reflex, but to the blood being permitted to flow in and out of the damaged region. These experiments offer an explanation for the good results which military surgeons often found followed rapid amputation of severely traumatized limbs.

Passing now from these experimental considerations to the stern facts of clinical shock, I think you will readily appreciate how important the laboratory findings have been in giving the surgeon a sound basis for certain efficient therapeutic measures.

MECHANISM OF SURGICAL SHOCK IN MAN

Early in 1918, the British Shock Committee decided that blood and plasma volume studies should be carried out on soldiers suffering from shock, in order to ascertain whether results similar to those obtained in animals held true in clinical cases. This study I undertook, and began work at No. 6 Casualty Clearing Station under the supervision of General Cuthbert Wallace, consulting surgeon to the First British Army. At that time, I had the idea that perhaps blood volume studies would help to differentiate the cases that were actually suffering from hæmorrhage from those in a state of shock. I might say here that in the majority of instances of wound shock, a certain amount of hæmorrhage had taken place. Total blood and plasma volume were found to be consistently reduced in soldiers suffering from wound shock. Further, the diminished blood volume was soon recognized to bear a definite relationship to the severity of the patients' clinical condition. The next step was to ascertain, if possible, whether the deficiency of blood in the circulation was entirely due to blood lost from the wound or if other factors played a part in causing the low blood mass. For in normal individuals, such as a donor for transfusion, the withdrawal of a considerable quantity of fluid up to 900 cc. is followed by a very rapid return of the blood to its original level, and usually no subjective or objective symptoms develop.

DONOR FOR BLOOD TRANSFUSION

Name	Age	Weight in Lbs.	Date	Wound	Pulse rate	Resp. rate	Blood pressure		Blood							
							Systol.	Diastol.	W.B.C.	R.B.C.	Hgb. %	Haem. absorpt. %	Blood volume c.c.	Blood volume % body wt.	Plasma volume c.c.	Plasma volume % body wt.
A. C.	19	65	4.VIII.18	Donor for transfusion Before bleeding	60	20	118	78	8,000	5,400,000	80	37	5,850		3,710	
				880 c.c. blood removed from vein—												
				1 hour after bleeding	60	18	120	80	10,000	5,000,000	80	37	6,060		3,820	
			5.VIII.18	24 hours after bleeding	64	20	100	65	9,000	4,600,000	82	35	5,260		3,420	
		65	11.VIII.18	7 days after bleeding	68	20	120	75	6,000	4,100,000	80	32	5,380		3,660	

Dreyer and Walker have made the same observation on experimental animals. The reaction in this donor would indicate that not only can the original volume be reached within an hour, but that the compensatory process of supplying fluid to the circulation may be carried still further and result in an actual increase in the blood volume. However, when the loss of blood is excessive, or when there is severe trauma, a shock-like condition follows, which is distinguished by a failure of the normal process of rapid restoration of fluid to the vascular system. Even without hæmorrhage, shock may be accompanied by a fall in blood volume. This point was well brought out in the clinical case described at the beginning of this paper. Thus, it seems clear that the condition of suspended circulation produced in experimental animals is present in cases of clinical shock. Further study established a more or less definite relationship between certain symptoms and the extent of the blood volume reduction. When the blood volume was above 75% of the normal, the general condition of the patient was good and marked persistent untowards symptoms did not develop. It was when the total blood volume ranged between 65% and 75% that the patient's condition is serious. Several observations were made on cases in which the total circulating blood amounted to less than 60% of the normal, and needless to say, these soldiers were critically ill.

BLOOD VOLUME CHANGES IN CASES WITH RECOVERY

The rapid addition of fluid to the circulation after a moderate hæmorrhage suggested that a similar, but modified, process possibly occurred in cases recovering from wound shock. Then again, the intimate relationship between diminished blood volume and the characteristic symptoms of wound shock, as seen in this series of cases, also indicated that the actual volume of circulating blood must be increased in order that recovery could occur. With the object of ascertaining the blood and plasma volume changes in such cases, the following case was closely observed and blood studies repeated at frequent intervals. The wounded soldier reached the Casualty Clearing Station twelve hours after receiving the wound, which consisted of an extensive comminuted fracture of the left femur. There was no external laceration of the skin and consequently no wound infection. He presented all the characteristic symptoms of wound shock. The blood and plasma volumes were respectively only 64 and 69 per cent. of the normal. The pulse rate was 120, the systolic blood pressure 70, and the pulse pressure 20 mm. Hg. Treatment consisted simply in the application of heat and administration of a fluid diet. Next day the patient was clinically much improved, as shown by a slower pulse rate and rise in blood pressure. The total blood volume had been increased 400 c.c. and the plasma volume 500 c.c. On subsequent days during the first week his clinical improvement was gradual and definite, and at the same time the blood volume steadily increased.

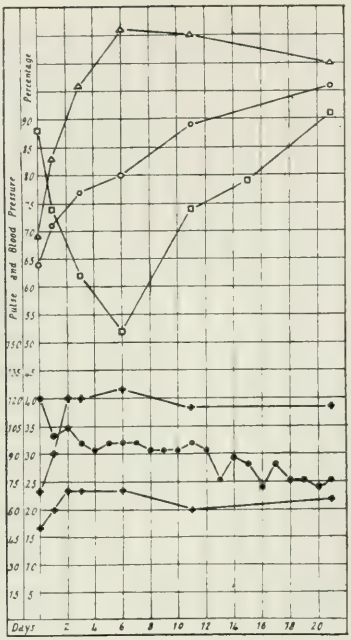

CHART II

Attention is drawn to the more rapid and greater proportionate increase in plasma volume than in the total blood mass. Associated with this addition of fluid to the circulation, there was a marked decrease in the number of red blood corpuscles, in the hæmatocrit reading, and hæmoglobin percentage. This spontaneous partial restoration of the blood volume by the rapid addition of fluid and consequent dilution of the remaining red blood corpuscles appears to continue until the fourth to sixth day after the primary hæmorrhage and shock. From that time onwards, the rise in the number of red cells and hæmoglobin percentage is steady, and the total blood mass increases proportionately. Robertson and Bock noted this fact on patients recovering from secondary hæmorrhage. The early high plasma percentage tends gradually to diminish as the number of red cells increases. Practically normal values were obtained for blood and plasma volumes, red blood corpuscles, hæmatocrit and hæmoglobin content on the twenty-first day after the wound was received. Spontaneous recovery from wound shock as described in the above instance occurred in three further cases, two of which underwent a surgical operation. No intravenous injections were needed to bring about an adequate restoration of blood volume. A second series of six cases presenting serious symptoms of wound shock had an initial blood volume ranging from 52 to 72 per cent. Infusions of 6 per cent. gum acacia or a transfusion of whole blood were administered before or at the

time of operation. Recovery was again accompanied by an increase in blood volume, due in large part to a rapid addition of fluid to the total plasma. This was especially marked following the infusion of 6 per cent. gum acacia.

TREATMENT OF EXPERIMENTAL SHOCK

Bayliss found in treating shocked animals that a 6% gum acacia solution, which has the same viscosity as whole blood and the same osmotis pressure as plasma, gave parallel beneficial results as transfusion of whole blood.

Erlanger also quite independently noted that shock was not as marked in animals that were given a previous injection of 20% gum acacia. He went further and found that if he standardized his method of producing experimental shock, 52% of the animals recovered spontaneously. But if in animals under similar conditions he injected a 25% solution of gum acacia, in 18% glucose, 74% recovered.

THERAPEUTIC CONSIDERATIONS IN CLINICAL CASES OF SHOCK

Recovery from shock in associated with a rise in blood volume. In slight cases spontaneous dilution takes place, though retarded. The application of heat, the liberal administration of fluid, are often sufficient to restore the patient's condition to one permitting operation. But in many cases of severe wounds these measures are insufficient to resuscitate the patient. More direct methods for increasing the blood volume are indicated. Normal or even hypertonic saline given intravenously has but a transitory effect. The addition of alkalis to the saline solution has given no better results in uncomplicated wound shock. Transfusion of whole blood is vastly superior to these solutions in that its effect is more lasting, which was attributed to the replacement of the blood lost. Technical and practical difficulties render this means unsuitable for extended use.

As a substitute for whole blood, Bayliss introduced 6 per cent. gum acacia solution, which Drummond and Taylor tested clinically on cases of wound shock and gave a favorable report. With more general use, however, failures have not been infrequent. In some cases the gum solution itself has been faulty. If it is made up correctly as described by Bayliss, I have found no untoward symptoms follow its use. Sometimes the administration has been at fault; the solution should be warmed to body temperature and run in slowly. But in spite of these precautions, there still remain a certain number of failures. In some of these latter cases I have found that neither the injection of gum nor yet the transfusion of blood has been successful. What experimental data were there at hand to offer an adequate explanation of the success or failure of the gum or whole blood? The fact that 6 per cent. gum acacia is chemically an indifferent fluid, having the same osmotic pressure as blood plasma, suggested the possi-

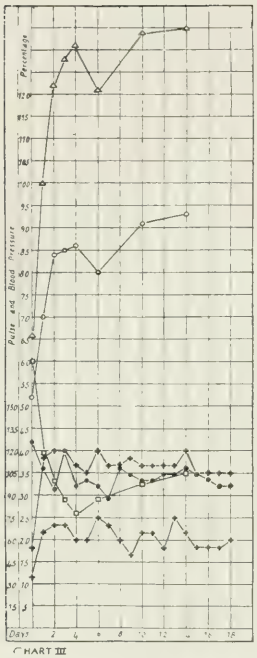

CHART III

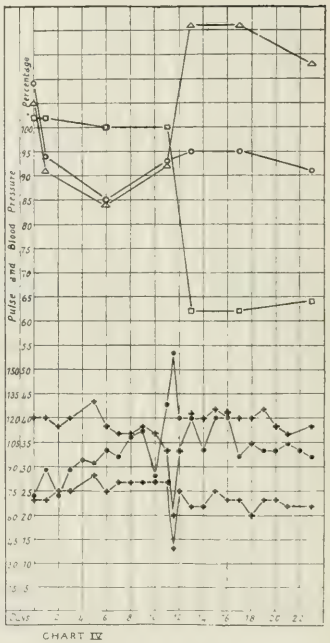

CHART IV

bility that improvement following its use was due to an increase in plasma and blood volume. An actual increase in plasma and total blood bulk was demonstrated after gum infusion in several cases with an initial blood volume of 51 to 60 per cent., and satisfactory recoveries resulted.

As was to be expected, the immediate rise in plasma content was more marked than the increase in total blood-volume. On the other hand, when the gum solution failed to improve the impoverished circulation, failure would seem to be due to the inability of the vascular system to retain the added fluid. Direct blood-volume estimations were difficult to carry out in these cases which failed to respond to the infusion, chiefly because of the low blood-pressure, but in a single instance after 1000 c.c. of gum solution had been injected, the increase in total blood-volume was only 200 c.c., and in plasma-volume 420 c.c.

An autopsy, also, in one of these cases, that failed to react to the infusion of 1000 c.c., the lungs and subcutaneous tissues were found to be markedly œdematous. These observations, together with the absence of any physiological improvement in the circulation in numerous other cases following gum infusion, led one to the conclusion that the capacity of the blood vascular system to retain or absorb fluid had been permanently damaged. A like explanation for the failure of blood transfusion in cases of wound shock appears to hold good. In

one case, with a shattered lower leg and a blood-volume of 55 per cent. of normal on admission, 880 c.c. of whole blood was transfused. Ninety minutes later, no external bleeding having occurred in the interval, actual estimation revealed only the small increase of 150 c.c. in blood-volume. Shortly afterwards the patient died during operation. In a second case in which the blood-volume was not estimated there had been an obviously severe primary hæmorrhage, and the systolic blood-pressure was 40 mm. Hg. This patient was transfused with 900 c.c. of whole blood, and a few hours later died in a similar manner on the operating table. At autopsy in both cases there was œdema of the lungs and the tissues generally were more moist than normal, though not actually œdematous. These cases, along with other available data, go to show that failure to increase the fluid in the vascular system following intravenous injection of gum solution or whole blood occurs only when the blood-volume is greatly reduced and the marked reduction has persisted for a certain period of time.

Robertson and Bock have lately demonstrated that after severe hæmorrhage —particularly secondary hæmorrhage—the ingestion of large quantities of fluid by mouth, and per rectum will cause a marked increase in blood-volume. This fact has an important bearing on the treatment of shock cases, more especially when the blood volume is below the critical level. Saline can be forced per rectum, but the administration of fluids by mouth is impracticable in the severe case of shock, because vomiting so readily occurs. The subcutaneous route for the injection of saline would also seem to be contra-indicated because of the sluggish peripheral circulation and consequent slow absorption. The urgent immediate need of vascular fluid in serious wound shock must necessarily make the alimentary ingestion of fluid a secondary therapeutic measure to intravenous injection.

DETAILED PLAN OF TREATMENT

Having pointed out the importance of diminished blood-volume in wound shock and discussed the methods already employed to remedy the deficiency, it does not seem out of place to suggest a more detailed plan for the treatment of shock cases. The methods advocated can be carried out with a minimum of special apparatus and offer some very satisfactory therapeutic results. When the shock condition is not severe, rest in a warm bed until the surgeon can operate is usually all the care necessary. If symptoms of collapse develop during or after operation, fluid can be given (i) in the form of gum solution intravenously—500 c.c. as a rule suffices; (ii) saline per rectum by the continuous drip method, or injections of 400 c.c. every two hours. Improvement as indicated by the slowing of the pulse and rise in blood pressure generally occurs quickly.

The management of more severe cases is more difficult. The application of heat should first be given a trial. If after one or two hours the pulse does

not improve or the blood-pressure rise, the question of increasing the fluid intake must be considered. Fluid by mouth, except in small quantities as a mouth-wash, is contra-indicated, for the ingestion of larger amounts soon leads to renewed vomiting. Saline per rectum can be given as a routine measure on admission to the ward, and continued periodically for the first twenty-four hours; but in order to obtain a more immediate response, when the trial of heat has failed, an infusion of 500 c.c. of gum solution is indicated. Before administering the infusion, a hæmoglobin estimation is of value as a basis or starting-point for further determinations. The behaviour of the pulse and blood-pressure is recorded at half-hourly periods following the infusion. If definite improvement persists for two or three hours, surgical treatment can be instituted. However, if the improvement is only transient, a second infusion of gum can be administered, and frequently then a steady improvement follows, so that an operation can be performed. On the other hand, certain cases fail to respond to a second injection of gum, and if the hæmoglobin percentage is low, whole blood transfusion should be given a trial. The anæsthesia of choice for serious shock cases is undoubtedly nitrous oxide and oxygen.

Repeated hæmoglobin estimations in such severe cases are of special prognostic value. When dilution is taking place satisfactorily, the hæmoglobin percentage gradually falls; but, on the other hand, when fluid is not being retained in the vascular system, the percentage of hæmoglobin has little tendency to decrease, and may even show a rise. This latter finding makes the prognosis extremely serious. After dilution has taken place—usually two to six days—and the hæmoglobin percentage has dropped to, say, 30 or 40 per cent., the question of blood transfusion may become very important. This is especially pertinent in cases that are admitted in a state of shock and develop septic complications in the next few days. Further operations may be necessary, and because of the low hæmoglobin the possible recurrence of shock becomes a serious problem. Bazett has pointed out in this type of case that a hæmoglobin percentage below 35 is near the critical level, and advises the surgeon to be ready to perform a transfusion during the secondary operation. Then again, symptoms of shock may also arise after a secondary operation, with little or no anæmia present, a condition often arising in civil surgery. In one such case the infusion of 500 c.c. of gum solution produced a most satisfactory result. (Chart IV.) A rib resection was necessary for the proper drainage of a septic chest. Several hours after operation the patient went suddenly into a condition of circulatory collapse, which was indicated by a pulse of 160 and a systolic blood-pressure of 60 mm. Hg. Within an hour of the administration of the gum solution his condition was markedly better, and continued to improve during his further stay of two weeks in the C.C.S. This case affords a striking example of the value of repeated hæmoglobin estimations. In less than twenty-four hours from the time of the gum infusion the hæmoglobin had fallen from 106 to

80 per cent. That this fall was due to an actual dilution of the blood, was indicated by a definite increase in plasma volume.

SUMMARY

1. Reduction of total blood and plasma volumes are striking and important features in shock.

2. Decreased blood volume in shock is the result of a primary cause yet undetermined.

3. The actual volume of circulating blood must be considered when interpreting the red blood corpuscle count and the hæmoglobin percentage.

4. In shock without hæmorrhage there is a reduction in blood volume, but not to such a degree as when hæmorrhage also has occurred. With a blood volume below 75 per cent., the patient shows serious symptoms of shock; when it is below 65 per cent., his condition is critical.

5. After moderate hæmorrhage without shock the blood volume is rapidly restored.

6. Recovery from shock is associated with an increase in blood volume, which may take place with or without intravenous infusion of blood or gum-saline solution. The initial partial restoration of blood mass is due to a large increase in plasma volume.

7. An important factor in the treatment of serious cases of shock is to increase the amount of fluid in the circulation. For this purpose intravenous infusion is essential.

8. The choice of anæsthetic is of great importance. Nitrous oxide and oxygen is undoubtedly the most satisfactory.

9. In certain cases of severe shock the blood-vessels are incapable of retaining an adequate amount of fluid in the circulation.

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SOME NOTES ON THE PROGRESS OF MEDICAL SCIENCE

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> Prom,—Hearing what remains thou'lt wonder more;
> What arts and what resources I devised,
> And this the chief: If any one fell ill,
> There was no help for him, nor healing food,
> Nor unguent, nor yet potion, but for want
> Of drugs they wasted, till I showed them
> The blending of all mild medicaments,
> Wherewith they ward the attacks of sickness sore.
> —Aeschylus.

The art of healing is supposed to have been discovered to man by Prometheus, the God of Fire, who was conceived to be the champion of man against the oppression of Zeus. This event took place supposedly about 500 B.C., when our ancestors apparently did not know much about the healing arts; and having got themselves in wrong with Zeus, felt the consequences of their lack of knowledge. In ancient Greece the God of Healing was Apollo, who was physician to the Olympian Gods, and whose diseases he healed by means of a preparation of peony root. This would indicate that these gods, in spite of their supposed immortality, were not immune to disease. Whoever heard of a sick god? In the Odyssey, a healer of disease is more welcome at a feast than a builder of ships or a prophet. I suppose his services would be required to treat the effects of the morning after. Of course this is all more or less mythical; but the ancient Greeks, from whom we have our first knowledge of medicine, believed in all these various gods and godesses, who had to be consulted and propitiated in any undertaking of importance. Hence the sacrifices and ceremonies of which we read. We, of course, do not believe in these old gods. One God is sufficient for us.

The writings of Hippocrates, who lived about 460 to 380 B.C., are the earliest records we have of ancient Greek medicine. He is supposed to be descended from Aesculapius, the son of Apollo. Even before his time there was a considerable medical tradition in Greece, but no records are available. All the writings of Hippocrates, or rather all those which are attributed to him, are probably not his. Among those considered genuine is the famous oath. His first aphorism is applicable to the present age: "Life is short and the art is long; the occasion fleeting; experience fallacious, and judgment difficult. The physician must be prepared, not only to do what is right himself, but also to make the patient, the attendants and externals co-operate."

The requirements of the medical art, as put forward by him, are still essential. "Whoever is to acquire a competent knowledge of medicine ought to be possessed of the following advantages: a natural disposition, instruction, a favorable situation for the study, early tuition, love of labor, leisure." I do not think we can add anything to this list, unless it be sufficient financial resources to see us through our undergraduate days. I have heard that this is not absolutely necessary. Opinions vary.

"Inexperience is a bad treasure and a bad fund to those who possess it, whether in opinion or reality, being devoid of self-reliance and contentedness, and the nurse both of timidity and audacity."

Can we not, all of us, recall the shrinking nervousness and feelings of doubt and incompetence with which we approached our first case? Did we not wish ourselves elsewhere? Did we not wish that some other physician of more experience, if not of greater knowledge, had been sent for? "Timidity betrays a want of powers, and audacity a lack of skill. They are indeed two things, knowledge and opinion, of which one makes its possessor really to know, the other to be ignorant." These things are just as true to-day as they were in 500 B.C.

The earliest physician of whom we have record was an Egyptian, I-em-hetep (he who cometh in peace), who lived about 4500 B.C. Even in ancient times the tendency was to specialize. Herodotus, who lived in the fifth century B.C., tells us in his account of Egypt, that, "The art of medicine is distributed thus: each physician is a physician of one disease, and no more. The whole country is full of physicians; for some profess themselves to be physicians of the eyes; others of the head; others of the teeth; others of the affections of the stomach, and others of the more obscure ailments." Specialization might be said to have been carried to extremes. There were dentists in those days. Whether or not there was painless dentistry I am not sure. I am inclined to think there was not, and that treatment of the teeth was undertaken only after a great deal of physical and mental anguish on the part of the victim.

Herodotus also gives us an account of the art of embalming. It is a question whether this may be considered as a part of medical science. I presume it may be, in that it is the care of the results after medicine has done its best—or worst.

In ancient Egypt, whenever a man of any prominence died his relatives and dependents, both male and female, plastered their heads with mud and went out to and fro in the city and beat themselves. Having done this they took the body to be embalmed. The methods employed produced a permanent result. Bodies have been found which are centuries old and still are in a fairly good state of preservation. The procedure was as follows:—"First with a crooked iron tool they draw out the brain through the nostrils, extracting it partly thus, and partly by pouring in drugs. After this they make a cut, with a sharp stone of Ethiopia, along the side, and take out the whole contents of the belly. When they have

cleared out the cavity and cleansed it with palm wine, they cleanse it again with spices pounded up. Then they fill the belly with pure myrrh pounded up with cassia and other spices, except frankincense, and sew it together again. Then they keep it covered up in natron for seventy days. When the seventy days are passed they wash the corpse and roll its whole body up in fine linen cut into bands, smearing these beneath with gum, which the Egyptians use instead of glue. Thus they deal with corpses which are prepared in the most costly way."

Apparently the pocketbooks of the survivors were taken into consideration, and there were less expensive ways of treating a body. No doubt all classes could be accommodated in some manner.

In ancient Babylon the inhabitants regarded disease as the work of demons which lived in the air, the earth or water. Herodotus tells us:—"They bring out their sick to the market place, for they have no physicians. Then those who pass by the sick person confer with him about the disease to discover whether they themselves have been afflicted with the same disease as the sick person, or have seen others so afflicted; thus passersby confer with him and advise him to have recourse to the same treatment as that by means of which they escaped a similar disease, or as they have known to cure others. And they are not allowed to pass by a sick person in silence without inquiring into the nature of his distemper."

Here the whole populace was the physician. No doubt the number of methods of treatment advised in any given case was limited only by the ability of the victim to listen to the passersby. I have no doubt the advice was voluminous and varied. We know from the code Hammurabi (2250 B.C.), that the profession in Babylon progressed far enough in the public regard to be rewarded with adequate fees, which were regulated by law.

In point of time Jewish medicine is allied with that of Babylon. The Bible is authority for some information; also the Talmud. In the Old Testament, the wrath of God is expressed in the form of certain diseases by which the people were afflicted. For instance: "I will bring none of these diseases upon thee which I have brought upon the Egyptians; for I am the Lord that healeth thee." The priests acted as sanitary advisers, but there is no reference to them acting as physicians. We learn in II. Chronicles, xvi., 12-13, that the king consulted physicians . . . and, "slept with his fathers." Not a very flattering tribute to the profession, is it?

In the ritual of circumcision we are told that the wife of Moses "took a sharp stone and cut off the foreskin of her son." This is the only surgical operation mentioned in the Bible.

The chief interest in Biblical diseases centres in the efforts made towards prevention. Very rigid laws are laid down regarding the touching of unclean things, proper diet, purification, etc. Definite instruction is given regarding isolation, segregation and disinfection.

That the physician was highly esteemed by the Jews is shown by the following:

1. "Honor the physician according to thy need of him, with honors due him. For verily the Lord hath created him."

2. "From the Most High cometh all healing and from the King he shall receive a gift."

3. "The skill of the physician shall lift up his head. And in the sight of great men he shall be admired."

Jesus, son of Sirach (180 B.C.).

There is no evidence of any special medical education among the Jews, until the Alexandrian period. Hebrew physicians did not obtain any great reputation till the middle ages and in modern times.

The ancient Hindus excelled all nations of their time in surgery. In early documents (1500 B.C.) medical treatment consisted of spells and incantations to cast out demons; and against such human agents as witches and wizards. About 120 or so instruments have been described, such as knives, lancets, saws, catheters, probes, etc. Apparently they had knowledge of surgical manipulations except the use of ligatures. They did amputations, checking the hæmorrhage by means of cauterization. Skin grafting and some phases of plastic surgery were known.

Galen (131-201 A.D.) was probably the greatest Greek physician after Hippocrates. He lived in the Graeco-Roman period (146 B.C. to 476 A.D.). After the destruction of Corinth, the headquarters of Greek medicine was transferred to Rome. The medicine of this period was chiefly in the hands of the Greeks. Galen is the best known physician. He was the most skilled practitioner of his time. The Romans excelled in military science and law. For the healing art they depended on their medical slaves and their medical gods. On their own account they took very little interest, most Romans considering the profession beneath them. Their engineering feats are remarkable, and some of them exist to-day. Their contributions to medical science are not of great value.

Galen has given us the four classic symptoms of inflammation. He differentiated pneumonia from pleurisy, and was the first to mention aneurysm. He mentions phthisis and its infectious nature, and advocated a full milk diet and suitable climate in its treatment.

Mohammedan physicians owed their first medical knowledge to Nestorius, a priest of the then hated sect of Christians. Rhazes (860-932) is probably their outstanding figure in medicine of the time. His description of smallpox and measles is the first we have, although smallpox has been vaguely described by some of the church fathers in the sixth century.

In medieval times the practise of medicine was hampered by ignorance and superstition and by law. There was a law of the church which forbade a physician to shed blood. Therefore a physician could not be a surgeon, and the practise of the two arts was kept separate. Consequently the practise of surgery of Frederick the Great it had not recovered its dignity; for it was one of the

duties of the army surgeons to shave the officers. It was beneath the dignity of the physician to charge a fee. He could, however, accept a gratuity from the patient if it were offered; always providing the patient recovered.

The surgeon, since he was not held in so high rank as the physician, and since it was not beneath his professional dignity, could charge a fee and collect it if he were able. From the information at hand regarding fees for surgical services, in bygone times, it appears that the modern surgeon is not the robber some people would have us believe. Ambroise Paré, for instance, speaks of fees in the shape of a cask of wine; fifty double ducats and a horse; a diamond; a collection of crowns and half-crowns from the ranks; three hundred crowns from the King, etc. Some of these fees make the modern surgeon look like a piker, when value received is considered.

In 1140 an edict was issued in Sicily by Roger II. forbidding anyone to practise medicine, on pain of imprisonment, without having first passed a satisfactory examination. In 1224 this was given a wider scope. The examination was based on the works of Hippocrates, Galen, and Avicenna. The license was issued by the emperor himself. The time required for preparation and study was eight years, and the candidate, in addition, had to serve one year under an experienced physician. The preparation for and the practise of medicine, in those days, was truly a strenuous undertaking; and the practise was a perilous one in case the surgeon should operate unsuccessfully on some feudal lord. If this misfortune should happen, he stood in danger of life and limb.

Medical practise during the Renaissance was much embarrassed by herb doctoring and quackery. The physician usually believed in astrology. Every court physician was an astronomer; practically a fortune teller. Quackery flourished unchecked. The great mass of booth-surgeons, lithotomists, etc., were, according to William Clowes, "No better than vagabonds, shameless in countenance, lewd in disposition, brutish in judgment and understanding."

Most of the surgery in Paré's time, so far as I am able to judge, was of the military variety. The modern army has at its disposal, a highly organized medical service, which is a definite unit, devoting all the skill of its members to the saving of life. The meanest soldier in the ranks receives the same careful attention as does the general officer. In bygone days it was different. In the time of which we are speaking, the lot of the wounded private soldier was one of misery and neglect. The great nobles had their private physicians. The common soldiers doctored themselves or had recourse to the services of barber-surgeons and quacks. Quacks were just as great nuisances in those days as they are in the present.

In the very nature of the fighting, which was close work and mostly hand-to-hand, many ugly wounds were given and received. Since anti-sepsis was unknown, and cleanliness was conspicuous by its absence, infection and suppuration were inevitable. The wounded were treated by having boiling oil of elders mixed with treacle, "introduced well into the wounds at the first dressing." This was, to say the least, rather a painful proceeding.

Paré was somewhat skeptical of this line of treatment, but finding it was the common method, he employed it. In his Journeys in Diverse Places, he gives us a good idea of the surgery of the sixteenth century. Of his own results, he modestly says, "I dressed him and God healed him." Of his experience on one occasion he says, "When the oil ran short, I was forced to apply a digestive, made of the yolks of eggs ,oil of roses, and turpentine. In the night I could not sleep in quiet, fearing some default in not cauterizing, and fearing I should find the wounded, to whom I had not used the said oil, dead from the poison of their wounds; which made me rise very early to visit them, where beyond my expectation, I found that those to whom I had applied my digestive medicament had but little pain, and their wounds without inflammation or swelling, having rested fairly well all night. The others to whom the boiling oil was used I found feverish, with great pain and swelling about the edges of their wounds. Then I resolved never more to burn thus cruelly, poor men with gunshot wounds."

The treatment of a compound fracture is a serious business. It was more so in the time of Paré. He says: "On seeing him I found him in a high fever, his eyes deep sunken, with a moribund yellowish face, his tongue dry and parched and the whole body much wasted and lean, the voice low as of a man very near death; and I found the thigh much inflamed, suppurating and ulcerated; discharging a greenish and very offensive sanies. I probed it with a silver probe, wherewith I found a large cavity in the middle of the thigh, and others around the knee, sanious and cuniculate; also several scales of bone, some loose, others not. The leg was greatly swelled and imbued with a pituitous humor and bent and drawn back. There was a large bed sore. He could rest neither day nor night and had no appetite to eat, but very thirsty. I was told that he often fell into a faintness of the heart and sometimes as in epilepsy, and often he felt sick with such trembling he could not carry his hands to his mouth. Seeing and considering all these great complications and the vital powers broken down, truly I was very sorry I had come to him, because it seemed to me there was very little hope he could escape death. All the same to give him courage and good hope, I told him I would soon set him on his legs, by the grace of God, and the help of his physicians and surgeons."

Do we not apply the same line of mental treatment, and for the same reason?

"Having seen him," says Paré, "I went a walk in a garden, and prayed God he would show me this grace, that he should recover, and that he should bless our hands and our medicaments, to fight such a complication of diseases. I discussed in my mind what means I must take to do this. They called me to dinner. I came into the kitchen and there I saw taken out of a great pot, half a sheep; a quarter of veal; three great pieces of beef; two fowls, and a very great piece of bacon, with abundance of good herbs; then I said to myself that the broth of

It is evident that there were no such things as food regulations and restrictions here. Perhaps the lord of the castle was his own food controller, since he the pot would be full of juices and very nourishing."

probably controlled everything else in the vicinity. At any rate we learn that he was a stubborn sort of person; for, "it was near two months since they were able to get leave to put clean sheets on his bed." Neither would he allow any of the local surgeons to do any operating for the relief of his leg. Of course, no person would attempt to do anything for him without his permission. In our time, permission would probably not be asked, but whatever was necessary, would be done whether permission had been given or not. However, in the time of which we are speaking, it was not so simple. The power of the noble was absolute, and any unauthorized interference would find the offender hustled off to a dungeon, there to meditate on his presumption. If nothing worse than this happened to him, he could consider himself rather fortunate in being thus lightly punished.

In spite of the hopelessness of the case, Paré decided to attempt something. The outline of his treatment is quite interesting. "To restore the warmth and nourishment of the body, general friction must be made with hot cloths, above, below, to right, to left, and around, to draw the blood and vital spirits from within outward. For the bed sore he must be put in a fresh bed with a clean shirt and clean sheets. Secondly, having regard for the great swelling and coldness of the limb, we must apply hot bricks around it and sprinkle them with a decoction of nerval herbs in wine and vinegar; after first making openings in the thigh to let out the matter. To his feet, an earthenware bottle filled with the decoction, corked and wrapped in cloths. The whole thigh must be fomented with a decoction made of sage, rosemary, thyme, lavender, flowers of chamomile and melilot, red roses boiled in white wine: with a drying powder made of oak ashes and a little vinegar and half a handful of salt."

"We must apply to the bed sore a large plaster made of the dessicative red ointment and unguentum comitissae of equal parts mixed together, to ease his pain and dry the ulcer; and he must have a pillow of down to keep all pressure off. . . . And for the strengthening of his heart, we must apply over it, a refrigerant of oil of water lilies, oil of roses, and a little saffron dissolved in rose vinegar and treacle, spread on a cloth of red." (I suppose no other color would do.) "For the syncope from the exhaustion of the natural forces, troubling the brain, he must have good nourishment full of juices as raw eggs, plums stewed in wine and sugar, broth of meat from the great pot whereof I have already spoken; the white meat of fowls, partridge wings minced small, and other roast meats easy to digest, as kid, pigeons, thrushes, partridges, and the like; with sauce of orange, sorrel, verjuice, sharp pomegranates; or he may have them boiled with good herbs as lettuce, purslain, chicory, bugloss, marigold, and the like. At night he can take barley water, with the juice of sorrel and of water lilies, of each two ounces, with four or five grains of opium, and the four cold seeds crushed, of each half an ounce, which is a good nourishing remedy and will make him sleep. His bread be farm house bread, neither too stale nor too fresh.

For the great pain in his head, his hair must be cut and his head rubbed with rose vinegar just warm, and a double cloth steeped in it and put there: also a forehead cloth of oil of water lilies and of roses, and a little opium and rose vinegar, with a little camphor, and changed from time to time. Moreover, we must allow him to smell the flowers of henbane and water lilies bruised, with vinegar and rose water and a little camphor, all wrapped in a handkerchief, to be held sometime to his nose."

Apparently nothing was left out. No chance was taken of omitting something which might have an effect on the condition. Artificial rain was advised as a sleep producer. The contraction of the leg, it was hoped, would be overcome when the pus was let out of the thigh, and "have rubbed the whole knee with ointment of mallows and oil of lilies and a little eau-de-vie, and wrapped it in black wool with the grease left in it." What was hoped from this last procedure I am unable to say, unless it was supposed to act as a poultice.

As to the result of all this, let Paré tell it. "I made openings in the thigh . . . . I got a bed made near his old one and had a strong man put him in it. He was very thankful to be taken out of his foul and stinking bed." He ought to have been. Remember, it was two months since the sheets had been changed. "The following days I made injections, into the depths and cavities of the ulcers, of Egyptiacum dissolved sometimes in wine, other times in eau-de-vie. I applied compresses to the bottoms of the sinus tracks to cleanse and dry the soft, spongy flesh; and hollow leaden tents, that the sanies might always have a way out, and above them a large plaster of Diacalcitheos dissolved in wine. I bandaged him so skillfully that he had no pain; and when the pain was gone, the fever began at once to abate. Then I gave him wine to drink, moderately tempered with water, knowing it would restore and quicken his vital forces. And all that we had agreed upon in consultation was done in due time and order; and so soon as his pains and fever ceased, he began steadily to mend. He dismissed two of his surgeons and one of his physicians, so that we were but three with him."

Compare this line of treatment with that of modern medicine. Here was a condition of a compound fracture, due to a gunshot, complicated by infection, suppuration, cellulitis, and osteo-myelitis. Incision and drainage we are, of course, familiar with. The multiplicity of remedial agents is not in accordance with our ideas. However, in this case they seem to have served a purpose. The patient also believed in plenty of medical advice; for we note that after he had dismissed two surgeons and one physician, there were three left. In spite of all this, the patient recovered.

In Paré's time and before, and probably since, it was the custom, after an amputation, to stop the hæmorrhage by cauterizing the vessels with red-hot irons. More pain and more shock, super-imposed upon that already caused by the operation; for there were no anæsthetics in those days. Paré used ligatures

instead of the added torture of the irons. For this innovation he was severely criticized by his contemporaries.

There is a story of one of Drake's captains, who during a battle with the Spanish fleet had his leg shattered by a cannon ball. The ship's surgeon decided that immediate amputation was necessary to save his life. The captain was a tough old sea dog, who thought that the handling of the ship and the direction of the fight were of more importance than his leg. The story tells that the leg was taken off, with the captain sitting on a stool on deck, and the usual cauterization with hot irons was done according to the best surgical practise of the time, while the battle went on around him.

Verily he was tough. It is told that he refused to quit his post until the fight was finished. I presume he recovered and lived to a good old age. Very likely a timber toe was substituted for the one he had lost, and he again took his ship to sea. Truly the treatment of surgical conditions in pre-anæsthetic and pre-antiseptic days was not to be lightly undertaken by either the surgeon or the victim.

William Harvey (1578-1657) is probably the greatest figure in seventeenth century medicine. To him we are indebted for our knowledge of the circulation of the blood and the action of the heart. "The actual quantity of blood makes it physically impossible for it to do otherwise than to return to the heart by the venous route."

With the advent of John Hunter, surgery began to have a place as a branch of scientific medicine. He was born in 1728, and died in 1793. His was a many-sided character. He was put to study medicine under his brother William, and inside a year was teaching anatomy on his own account. He developed a wide surgical practise, but devoted a large portion of his time to study and research. He is said to have dissected somewhere about 500 different species of animals. This in itself was no light undertaking. Many of his manuscripts were never published. The four greatest are:—Natural History of the Human Teeth, (1771); On Venereal Diseases (1786); Observations on Certain Parts of Animal Economy (1786); Treatise on the Blood, Inflammation and Gunshot Wounds (1794).

We cannot pass here without speaking a word of Edward Jenner, to whom we owe our knowledge of vaccination against smallpox. In Jenner's time and before smallpox was common. Almost everybody had it. Parents used to expose their children to the infection in order to have it over with, as used to be the case not so very long ago with measles. An attack of smallpox was the only protection against it. It was a universal scourge, and destroyed thousands of people annually. By means of cowpox virus, Jenner immunized a great many people against smallpox. Thus was a popular belief put upon a scientific basis: for it was known that an attack of cowpox produced protection against smallpox. This may be said to have been the basis of experimentation leading to the dis-

covery of vaccination. The result is that in our time smallpox is under definite control and comparatively few cases occur.

To Lord Lister we pay tribute for having led us to what knowledge we have of infection and the means to prevent it. In former times it was a rare thing for a wound to heal without pus formation. In fact it was regarded as essential for a wound to heal properly that there should be a free discharge. The surgical wards in a hospital were veritable hotbeds of infection. The so-called hospital gangrene was common. Needless to say, the mortality rate was high.

It was thought that wound infection was caused by the entrance of air; or that certain organisms were carried by the air. At any rate the air was blamed for it. Hence it was thought that if a wound could be protected from the air infection ought not to occur; or if the air could be purified in some way the same result would be obtained. Working on this idea, apparatus was devised, by means of which a spray of solution could be projected into the air in operating rooms during the time operations were being done. We know now that air does not carry infection to any great extent, and that most germs, if exposed to air and sunlight, are dried and killed, and so become harmless. This has been applied in the recent treatment of wounds, which, after rigid surgical cleanliness in handling, have been exposed to air and sunlight with excellent results.

Pasteur's researches into fermentation and putrefaction convinced Lister that pus formation was due to the presence of bacteria. He therefore concluded that the use of agents which would destroy these organisms would tend to the elimination of pus. If the casual agent were destroyed, then pus formation would not, and could not occur. This is true as far as it goes, for the first step in the treatment of any disease is the elimination of the cause.

No doubt infection was widely spread by methods of handling. Especially so in gunshot wounds. Two methods were in use to locate the missile. The wound could be probed by means of a metal probe or by the use of the finger. We learn that, "according to the high authority of Longmore it is preferable to use the finger." How easy, then, to spread infection. In the first place it is impossible to sterilize the finger, and in the rush and hurry of attending a great number of wounded it might not be possible, through lack of facilities, even to wash the hands after leaving one case and before passing to the next. Besides most gunshot wounds are dirty to start with.

Lister recommends the use of carbolic acid. In his Treatise on the Antiseptic Principles of the Practise of Surgery, he says:—"The material I have employed is carbolic, or phenic acid . . . which appears to exercise a peculiarly destructive influence on low forms of life. . . . In conducting the treatment, the first object is the destruction of any germs which may have been introduced into the wound. This is done by introducing the acid at full strength into all accessible recesses by means of a piece of rag held in dressing forceps and dipped in the acid. The next object is to guard effectually against the spreading of decomposition into the wound along the stream of blood and serum which oozes out. The method which I have hitherto published, ... consisted in the application

of a piece of lint dipped in the acid, overlapping the sound skin to some extent, and covered with a tin cap. When, however, the wound is very large, this is inadmissable on account of the extensive sloughing of the surface of the cutis. This difficulty has been overcome by using a paste compounded of carbonate of lime, mixed with a solution of one part of carbolic acid in four parts of boiled linseed oil, so as to form a firm putty. This application contains the acid in too dilute form to excoriate the skin, which it may be made to cover to any extent that may be thought desirable, while it serves as a reservoir for the antiseptic material." He recommends a daily dressing of the wound a,nd a change of paste, during which procedure the wound must be protected by means of a piece of lint dipped in the acid. These dressings must have been more or less painful. Probably not so much so as those done with the boiling oil of Paré.

A comparison of the two methods, Paré's and Lister's, indicates that surgery had made some progress in the time intervening; i.e., from 1590 to 1867. In the latter there is no multiplicity of drugs. No artificial rain is needed. All the numerous preparations mentioned in the former have been discarded, and the medical service is concentrated in one man, instead of being distributed among half a dozen.

The modern practise of surgery is too great a subject to be treated here. Lister's discovery forms the basis of procedure in so far as antiseptic is concerned. True, the use of carbolic acid has gone somewhat out of fashion; but we have substituted numerous other agents, as iodin, the preparations of mercury, permanganate of potassium, lysol, Dakin's solution, etc., which are equally as efficient. We can now go to a hospital and have our appendix removed, or an arm, leg, foot, hand, etc., amputated, if any of these be necessary, and feel reasonably certain that we shall not be afflicted with any such complication as hospital gangrene, and that our chance to die from septicæmia is very small.

Fortunately, too, we do not have to submit to having these things done without something to ease the pain. Opium was formerly used for this purpose, but anæsthetics were not generally used until about 1844. In that year Wells used nitrous oxide, popularly known as laughing gas. Morton about the same time made free use of ether. Shortly after that Simpson experimented with a great variety of substances, and chose chloroform as being the most suitable. Experience has made these drugs absolutely safe in skilled hands, and to-day they are universally known and used. If at any time any of us is in need of surgical treatment we need not hesitate on account of pain. It can be eliminated where necessary, and in any event greatly lessened.

Nor should we forget another self-sacrificing class of persons who have contributed much to the successful prastise of medicine. I refer to the trained nurse. The period, from the latter part of the seventeenth century to the middle of the nineteenth, was the dark age in the nursing profession. "The pudgy, slatternly, dowdy looking female, of drunken and dubious habits, was the type from the old colored prints to the time of Sairey Gamp."

"Lectured by committees, preached at by chaplains, scowled at by treasurers, scolded by matrons, sworn at by surgeons, bullied by dressers, grumbled at and abused by patients, insulted if old and ill-favored, talked flippantly to if middle-aged and good-humored, tempted and seduced if young and well looking—they are what any woman might be under the circumstances." (London "Times," April 15, 1857.)

Not a very pleasant outlook in the nursing profession in those days. Very likely it was worse than the description. How happily all is changed now.

The good work and self-sacrifice of Florence Nightingale is a matter of record. History bears witness to what she accomplished. When the Crimean War broke out in 1854 she took a body of nurses to Scutari and took over the military hospital at that place. Here men were dying like flies. Infection, suppuration, hospital gangrene, various fevers, flourished. The advent of these nurses changed things completely. Within a very short time the hospital was reorganized, and within ten days of their arrival more than 1,000 patients were being fed from the diet kitchen. Nursing she defined as "helping the patient to live."

In the Great War just closed perhaps the best known figure among the nursing profession is that of Edith Cavell, an English nurse who was executed in October, 1915, by the Germans, to their lasting infamy, during their occupation of Belgium. For what reason? Simply because she was accused of helping Belgians eligible for military service, and English and French refugees, to escape the country. Could any more ridiculous accusation be made the excuse for inflicting the death penalty? I am not sure that the charge was proved. The work she had done in caring for the wounded and sick, German as well as those of the Allies, carried no weight with her judges.

Looking back over the ages we see that the progress of medical science has been slow but sure. Up to the eighteenth century it was a prolonged and strenuous struggle towards the light. During that century and since gigantic strides have been made. In times past medicine was hampered by ignorance, superstition and law. It was regarded by some as the practice of magic. Disease was thought to be the work of demons, witches, and wizards; or was, especially in very early times, attributed to the displeasure of various gods and godesses. There were no such things as antisepsis and anæsthesia. There were no nurses, as we understand the meaning of the term. What nursing was done probably did more harm than good. There were no special requirements for the practise of surgery. Any person who would could be a surgeon. It is recorded that a certain man started out in life as a merchant, but not making a success of it decided to go in for the practise of surgery. Accordingly he hung up his shingle, or whatever it was they hung up in those days, hired some person to write a book over his name, and hired some would-be poet to praise him in verse, whereby he acquired considerable local fame and clientele.

In our time things are radically different. A prolonged period of study and preparation is necessary. The law of the land requires the passing of satisfactory examinations and the proof of qualifications. When all this has been done the candidate is only on the threshold of the science. The successful practise of medicine requires lifelong study. The public is protected to some extent, though probably not as much as we could wish, from incompetents and quacks.

The pudgy, slatternly, dowdy, possibly drunken, nurse of times gone by, with her haphazard and slapdash methods of doing things, has gone into the discard. Careless methods and chaotic organizations have been relegated to the scrap-heap. To-day the nursing profession is regulated by law. Its members are refined, educated and highly skilled. Team work is the order of the day, instead of chaos.

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THE BIRTH RATE

A. T. Bond, M.B., London, Eng.

Malthus laid down the theory, universally accepted, that the number of every species is not determined by the power of procreation but by the supply of food available. The numbers continually encroach upon the available means of support. In the struggle for existence, the species which survive, owe their success to two factors, enormous fertility or parental care. The lower species produce enormous quantities of eggs, of which an infinitesimal quantity escape destruction. One species is preyed upon by another. If a species is nearly exterminated by its enemies, they themselves die of starvation; consequently a remnant of the weaker, in a secluded spot, perhaps begin again to increase in numbers, thus, a sort of equilibrium is maintained. A continual warfare is waged with honors, first in favour of one and then the other contestant. Occasionally, owing to unusually favourable circumstances, a species becomes strongly established, as, in the case of the gopher of the Canadian West, or the rabbit in Australia. Rats drive out mice. The brown rat is said to drive out the black rats, who in turn may be exterminated by the more voracious grey rat.

In regard to microbic disease, the question of the immunity of the host has to be considered. The white race appears to have acquired a definite resistance to measles, which has deadly effects on the primitive races. The white scourge is particularly deadly to the Indian and the Negro. The same is true of smallpox. Science comes to the aid of civilization and drains the swamps so destroying the anopheles. Cleanlier habits destroy the louse and banish typhus. Sanitation wipes out typhoid.

The less the fertility the greater necessity for care. That parental attention is incompatible with the immense fecundity of the lower organisms is obvious, nor in view of nature's prodigality is it necessary. The obverse is equally true. Parental care is necessary, if any of the offspring of the higher species are to survive. The fewer the offspring the greater demand for parental care.

Man is no exception to these laws. Among the homeless barbarians the woman, carrying her baby, follows the man. They contend with storms, uncertain food supply, natural enemies. Under these circumstances the chances of rearing a large family are few, indeed.

Among the higher grades of savages with flocks, a more certain source of food, in more kindly climes, the tribes multiply in accordance with food supplies. How does civilization affect population? The history of the Greek is very enlightening. Greece at the best was a mountainous and unfertile country. It was believed among the Hellenes that there were too many people in the world. The supplies of food were limited, increased no doubt by trade. It became necessary to establish colonies to meet the existing circumstances of those early times. The available sites for colonization were limited. The problem of over-population was soon pressing upon the Greeks for solution. Incessant wars kept down the population, perhaps, but ancient wars were not very bloody. Nations soon recover from such losses. Hence it became necessary to limit the national increase. The Greek father had an absolute right to say whether the

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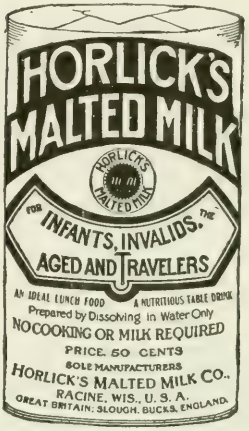

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infant was to be allowed to live or not. Daughters were more frequently sacrificed than sons. This loss was compensated for by the greater loss of males in war. The children were exposed in a jar. Naturally, sickly or deformed children were more often exposed. Anyone wanting to rescue the infants might do so.

After the time of Alexander, the population declined rapidly. The well-to-do, perhaps, limited their offspring to one or two so as to give them greater wealth and comfort. Probably, also, the forests were cut down and the rainfall diminished. The soil became less productive, the food supplies failed with the inevitable result. Various other causes contributed, accumulation of large estates, slavery, infanticide, celibacy, wars, massacres and pestilences, especially malaria. But all these things are recovered from usually with amazing rapidity. Perhaps the final decline was due to racial exhaustion—analogous to senile decay in the individual.

The effect of Christianity on population was far-reaching. The Christian gospel was of Jewish origin. The Jewish morality was Bedouin. Among these tribes infant life was held sacred. Marriage was regarded as a duty, and childlessness as a misfortune. This is reflected in the Bible story of Abraham. The strong national characteristic of the Jew made everyone anxious to have descendants, among whom, perhaps, a Saviour would lead his people to better things. Christianity taught the value of every life, set its face sternly against infanticide and immoral practices. Unfortunately the encouragement of celibacy of the bodies of religious thought deprived each generation of the offspring of many of the best.

During the middle ages the population question slumbered. The horrible sanitary condition of the walled cities made increase impossible. Wars, Crusades, pestilences like the black death swept away millions. This period contains the notable example of a sudden unaccountable and permanent decline in population. After a great display of energy and influx of wealth, Spain sunk rapidly into lethargy from which it has never recovered.

Since the middle of the 18th Century there has been a phenomenal increase in European population. In 1600, England and Wales is said to have had 4,800,000; in 1750, 6,500,000; in 1919, 37,000,000. This increase is due to the introduction of labour-saving machinery and the exchange of manufactures for food. Improved sanitation and medical science has increased the span of human life by one-third. This astounding result was bound to have a great effect on the birth rate. France has already reached the equilibrium. The old-established families of the United States are believed to be actually dwindling.

The more backward countries have, on the whole, a higher birth rate than the more advanced. This is offset by a greater death rate, so that the net increase is very little, if any, more than that of the lower birth rate. Australia and New Zealand, with low birth rates and low death rates, increased more rapidly than Russia with more than double the birth rate and several times the death rate. Surely a more desirable state of affairs. The state of Russia exists in an aggravated extent in India, while in China, seven out of ten children die in infancy.

In Great Britain, about forty years ago, a decline in the birth rate set in, till now, this fall amounts

to one-third. It corresponds very nearly with the fall in the death rate. Since 1877 large families have become increasingly rare in the upper, middle and skilled artisan classes. They are more frequent among the thriftless, unskilled labourers and among the miners. The lowest is amongst the professional classes. In the industrials the decline is marked among those classes in which the women work for wages as in Lancashire. Among the miners the wives do not work in the mines. Doubtless the raising of the age, at which a child is allowed to become a breadwinner, and thus add to the family resources, has resulted in reducing the birth rate and increasing the longevity of the child. Difficulty in finding houses, increasing expenses of education, high rates and taxes, high standards of living are reasons why large families are not discovered among the better classes The graduates of colleges show a decided unwillingness to marry. The numbers of children born from these marriages are very small—in some instances of statistics collected—less than one-third per cent. Everywhere the tendency is for the superior stock to dwindle till it becomes a small aristocracy. The subjugated peoples ultimately absorb the rulers. The negro and Italian and Slav emigrant is increasing in America out of all proportion to the English stock. The emigrant population of Canada is increasing much more rapidly than the British.

The falling birth rate unfortunately has not been among the insane, alcoholic, mentally deficient, hæmophilic, syphilitic, unmarried. There is no available evidence to show that undesirable parenthood is decreasing. The report of the National Birth Rate Commission (1916) and the complementary report just published, shows conclusively that the so-called "upper" classes have fewer children that the "lower." Large though the difference in mortality is, it is not sufficient to offset the consequences of the greater fertility of the lower classes. "In other words, the 'lower' classes have not only the highest total fertility, but the highest effective fertility." Unfortunately the decay of worthy parentage is a new phenomenon. It is no longer possible to suppose that this might have long been the case and that therefore experience has proved it to be compatible with such prosperity and advancement as has been achieved. It is an unquestionable fact that the largest number of children are being born in the most unfavourable environments, physical and psychical. Bad enough, even if it were possible to ignore hereditary influences. The nation is receiving about a child and a half on the average from married Army and Naval officers, clergymen, barristers, physicians, authors and persons of independent means. This decay of parenthood is due to nothing other than the deliberate will of the persons concerned, who are the educated, sober, successful members of the community. These persons are practising race suicide in the most drastic and effective fashion, beside, lowering the national physique to an appalling extent, as was shown by the medical examination of recruits during the late war.

It is commonly supposed that Roman Catholic countries have a higher birth rate than Protestant, as the Roman Catholic Church forbids artificial limitation of families. The birth rate is very high in Ireland. The French-Canadian are among the

Quotations from Doctors:

No. 3

"While on the subject of 'Depletion' perhaps a report of the following case may be of interest: Male, 66 years of age—diabetic—; retired at night in usual health—woke in morning with pain in region of elbow, arm enormously swollen, veins like whip-cords, edema—pitting on pressure. Diagnosis: probably thrombosis of basilic vein."

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most prolific races in the world, but their death rate is also correspondingly high. It will be observed, however, that the high birth rate is only true of backward Roman Catholic countries. Among the intellectual Roman Catholics, the laity has thrown off the rule of the priest—the birth rate declines as in France and Belgium. It is thus evident that the influence of Church is not sufficient to offset the fundamental principle of adequate food supplies. The advantages of numbers gained by Roman Catholics appear confined to those countries where there is ample room for expansion. As the population of Quebec becomes more crowded the tendency will be for emigration to other parts of Canada. Other standards taught by association with other people will offset the increase.

The population of any country depends on its supply of food. The choice is between a high birth rate and high death rate or a low birth rate and low death rate, between low standards and high standards of living. "As to the necessity of confining by birth control our own growing population and those of the civilized nations within reasonable limits, there can hardly be two opinions on its importance. It is obvious that a well-grown, healthy, highly developed people is happier in itself, and, even though limited in numbers, better able to resist attack than a puny, ill-grown horde, spawning in ignorance and confusion." Nations should cut their garments according to their cloth. The parents surely have a right to determine the number of their offspring and should be the best judges of their ability to give their children a fair start in life.

How then is restriction to be brought about? Infanticide and neglect, the oldest methods, exist now only in semi-civilized countries. Procuring abortion is a criminal act in most countries but practised to an appalling extent Two million births are so prevented annually in U.S.A. Four hundred thousand in Germany, fifty thousand in Paris, nineteen thousand in Lyons. It is exceedingly common in the United Kingdom. The great prevalence of the practice in U.S.A. is due to the drastic legislation against the sale and use of more innocent preventatives. The desire for small families is the result of high standards of living in that country. In every modern country population is restricted by postponement of marriage. The existence of the social evil fosters the practice of late marriage. It is not too much to hope that eventually the social evil will be stamped out. With this institution abolished the extinction of the disease associated then will become possible. Early marriages will become the rule. This fact with the vanishing of disease will tend to greatly accelerate the national increase of population. Some form of birth control will be imperative. It will be necessary to choose between a state in which birth is controlled or a state in which every available inch of ground is under cultivation, hours of work long and wages low, every individual braced in a stern struggle for a bare existence. Such a state will be menaced by other states in a similar predicament, eventually culminating in war between two over-populated countries, for both of which more elbow room is necessary. Such a war would necessarily be a war of extermination, besides which, the great war would sink into insignificance. The former is the choice which France and lately Holland have made

for themselves, to limit the population to the number the country can support in comfort. It is striking that in the past war the nations broke up in the order of their fecundity while France stood like a rock.

Will the removal of sharp competition lead to racial degeneration? Nature's law of the survival of the fittest must be replaced by rational selection, or reversion to a lower type is inevitable. The present deplorable tendency of the least desirable to increase out of proportion to the better classes must be combated. The submerged tenth must be raised where possible to a condition of self respect and responsibility. Expedients such as endowment of parenthood, better housing, at the expense of the taxpayer will have no effect, but to penalize those who pay the doles—the class that should be encouraged to reproduce. The uppper and middle classes must simplify their habits so as to make marriage and parenthood possible for the young professional man. Paradoxical though it may seem, neither voluntary restriction of births, famine, war, or pestilence has much effect on reducing numbers. They are followed at once by an increase in the birth rate. The tremendous losses of the late war would be rapidly recovered if not for the destruction of capital and credit needed to supply sustenance. Though the British Islands are dangerously overcrowded, the British Empire is far from being over-populated. An intelligent emigration policy offers a solution for some years to come by absorbing the surplus population of the Mother Country. Canada runs a risk of allowing the emigrant population of Jews and central Europeans to outstrip the British stock. Nor can the disproportionate increase of the French-Canadian be forgotten. Encouragement of British emigration more carefully supervised than in the past is the remedy suggested. Canada is able to support many millions without endangering our high standard of living. Millions are needed to develop our illimitable resources.

ON WOOD-ALCOHOL POISONING

Since the advent of prohibition, there have occurred a number of fatalities from the substitution of methyl alcohol for ethyl alcohol in beverages. If you take away something to which the people have been accustomed for years, what will they take as a substitute?

Dr. S. Dana Hubbard, of New York, contributes an article to the *New York Medical Journal* (Jan. 3, 1920), on wood-alcohol poisoning, in which he describes the clinical picture of this form of poisoning.

The symptoms of acute wood-alcohol poisoning are similar to those observed in cases of poisoning by grain alcohol and other alcohols of this series. The acute form of wood-alcohol poisoning may be divided into three stages.

1. An ordinary mild intoxication, with some dizziness, nausea, and mild gastrointestinal disturbance, terminating in recovery within a few days. There may occur, occasionally, some damage to vision.

2. A more pronounced effect, with accentuation of the symptoms, especially, severe gastroenteritis and dimness of vision.

3. An overwhelming prostration which terminates in coma and death.

The characteristic feature in most of the severe cases of wood-alcohol poisoning that do not terminate fatally is, total blindness, coming on in a few hours, or, perhaps, not for several days; then, a partial restoration of vision which, in a few days, or weeks, gives place to more or less complete and permanent blindness with atrophy of the optic nerve.

There is no antidote for this form of poisoning, and the treatment of many of these cases is entirely symptomatic. Dr. A. H. Brundage, who has reported several cases, recommends the following general therapeutic measures: Syphonage of stomach, cold affusions to the head, cardiac stimulants, inhalations of oxygen, pilocarpine injections, external heat to the body and extremities, moist heat over the kidneys, rectal enemas of hot coffee and normal salt solution. The treatment of the optic nerve atrophy is not very satisfactory. In the early stages, he recommends pilocarpine and iodide of potassium, later, strychnine by hypodermic injection and by mouth.

DRUG TREATMENT OF HEADACHE

As to drugs (and it is upon these that the practitioner, particularly in poor-class practice, has largely to rely, both for their therapeutic value and for their aid to suggestion), perhaps the most valuable of all is valerian, either the valerianate of zinc and iron given in the form of a pill or the ammoniated tincture of valerian, usually employed in a mixture which also contains some stimulants such as strychnine, or else in combination with some sedative, for instance, bromide of ammonium.

Valerian often will act like a charm in these cases, in spite of the libellous statements made by those people, who, after years of careless dispensing, tell us that they do not believe in drugs! Salicylates, phenacetin, and their allies should be strictly avoided, but, simple tonics often may be employed with great advantage, and it should at the same time be impressed upon the patients that their benefical effects will largely remain latent unless their use be associated with regular outdoor exercise and careful attention to the bowels. Sometimes, when other methods have failed, the condition is relieved by a complete change of air and surroundings, wherein, again, the element of suggestion plays its part. Relief obtained in this way is rarely permanent, whereas drugs may be employed over a long period with progessively decreasing doses and given at less frequent intervals. The headaches of neurasthenia occasionally recur with a periodicity suggestive of migraine. This is particularly the case in those persons who are also victims of intestinal intoxication.—Kenneth Clark in *The Practitioner*, May.

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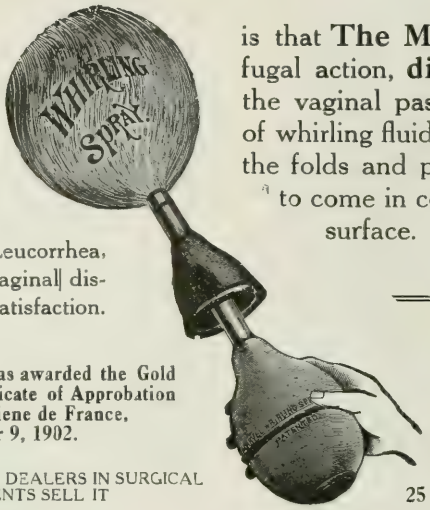

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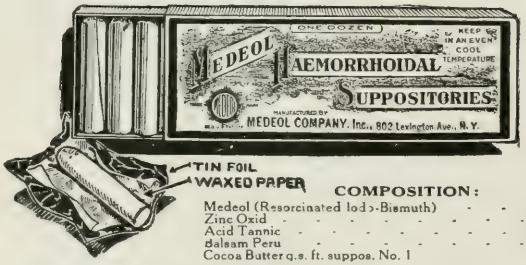

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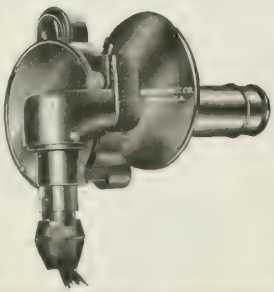

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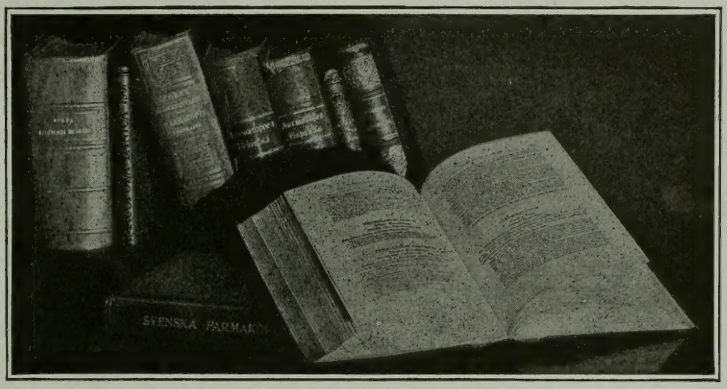

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